Coal Age

FEBRUARY, 1956

A McGRAW-HILL PUBLICATION—PRICE 50c

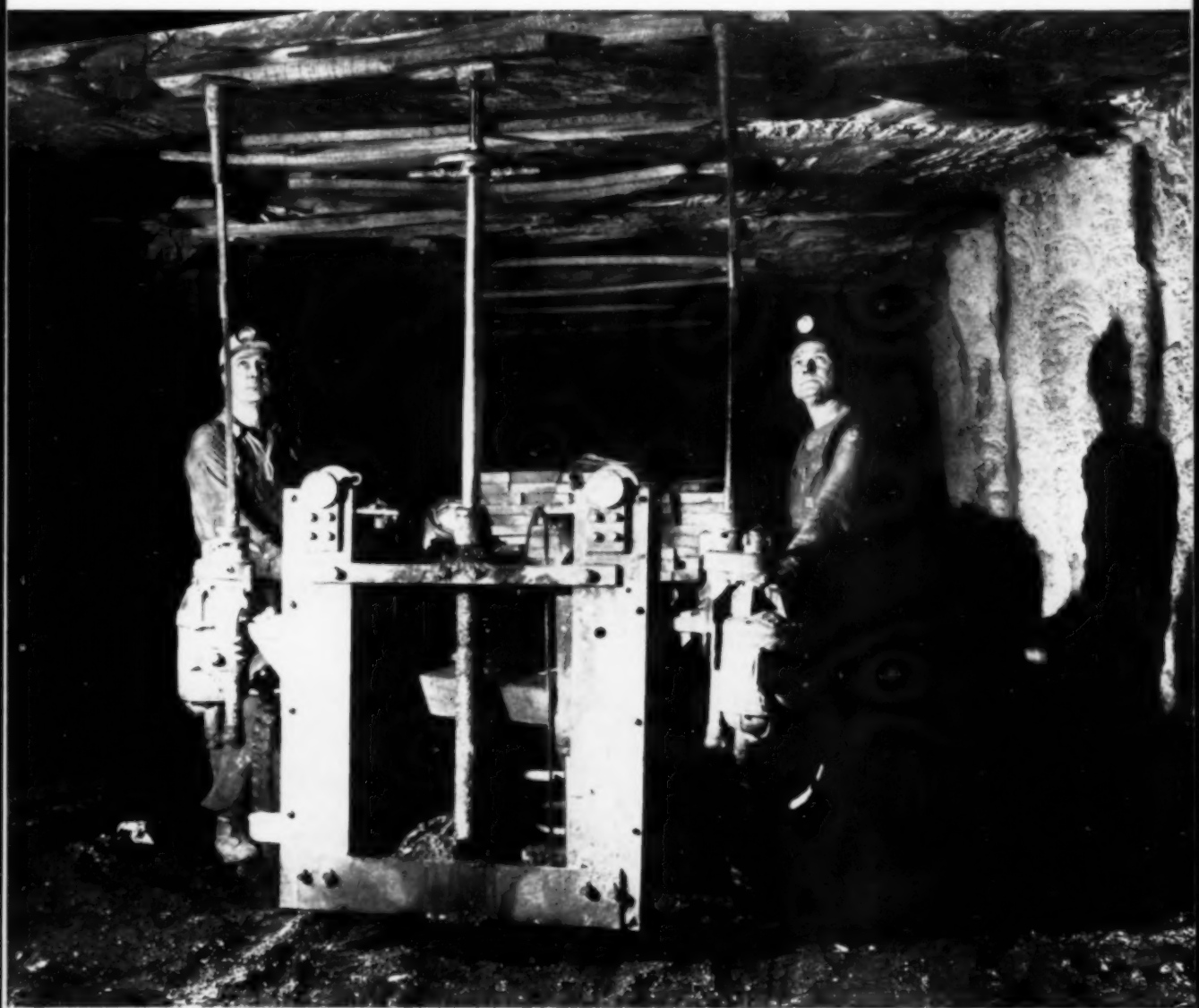
Enoco Collieries:

Pillar recovery with AC-powered-mining machines —p 88

Delta Collieries:

New 36-yd shovel, big drill, multiple blasting pay dividends—p 78

Full Contents . . . p 5



1955 Review: Coal on the Upsurge . . . p 54-76





M-S-A Type D ALL-WEATHER FIRST AID KITS

When emergencies call for first aid, these kits provide all the advantages for quick, complete treatment. Unit packages, easily replaced, are arranged for fast selection, contain one or more complete dressings or treatments for each injury. All dressings are sterilized and ready for use. Cellophane package wrappings protect contents. The kits, available in 10, 16, 24, and 36 units, are made of 20-gauge steel, with carrying handle, and mounting brackets. Case is dust and moisture-proof. Ideal for carrying on jeeps, motors or other mechanized equipment. Complete instructions with each kit. Write for details.



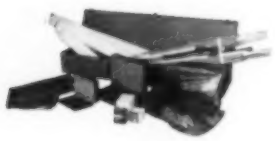
M-S-A MINER'S FIRST AID CABINET

Contains complete assortment of first aid material and supplies. Ideal for mine hospital or dressing stations. Contents conform to U. S. Bureau of Mines recommendations.



M-S-A FOILLE BURN KIT

Contains four 10-ounce Foille Aerosol Sprays, easy-to-use Type D first aid dressings and accessories. Stored in All-Weather steel case. Permits fast effective burn treatment.



M-S-A EMERGENCY FIRST AID OUTFIT

Ideal for storage underground where a compact unit is needed. Contents selected to meet practically every emergency. Includes two first aid kits, blankets, splints, Redi-Heat Blocks, stretchers. Sturdy steel case.



M-S-A STANDARD STRETCHER OUTFIT

Complete assortment of first aid dressings and supplies arranged in a strong dust-proof canister. Contains stretcher, blankets, first aid materials, splints. Designed for first aid rooms, dressing stations.

M-S-A . . . headquarters for First Aid Equipment

Above are a few of the many first aid supplies and treatments available from M-S-A. This material is the result of years of experience in serving the mining industries' requirements.

Our knowledge of emergency needs has developed the design and contents of our first aid line.

You will find complete information in our Mining Catalog····28 pages are devoted to illustrations and detailed information on these and many other first aid supplies. We will be happy to send you a copy upon request.

MSA
SAFETY EQUIPMENT HEADQUARTERS

When you have a safety problem, M-S-A is at your service . . . our job is to help you

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pa.
At Your Service 77 Branch Offices in the United States and Mexico

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.
Toronto, Montreal, Calgary, Edmonton, Winnipeg,
Vancouver, Sydney, N.S.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



That B. F. Goodrich cord belt needed no maintenance in 8 years

THAT belt, climbing 960 feet up a 14-degree incline, carries run-of-mine coal from mine to cleaning plant. A B. F. Goodrich *cord* belt was selected for this job because engineers knew no ordinary belt could handle the heavy loads over such a long incline.

Unlike the usual conveyor belt made of rubber and layers of fabric, the B. F. Goodrich belt is made with separate cords, each surrounded by rubber, running the length of the belt. When heavy loads hit this belt it "gives"—absorbs the shock instead of fighting it. The cords make the belt stronger, too, without making it stiff, so it can haul up steep inclines and still keep its U-shape to prevent spilling.

Operating personnel like the belt for it requires no training. What's more, it has needed no maintenance whatsoever in 8 years. This lowers their cost per ton of coal. They expect the belt to last for at least six more years, reducing the cost even more.

The ability to haul heavy loads long distances up steep inclines is just one of the many reasons B. F. Goodrich cord belts last longer, cut coal-handling costs. Other important construction features include high impact resistance, double protection against mildew and natural troughing.

Also available are belts made of fire-resistant rubber. Rubber will not burn by itself. No matter what type or size of coal you have to move, there's a B. F. Goodrich Caricoal belt that can do it better, for less. Let your BFG distributor give you full details. Or write *The B. F. Goodrich Company, Dept. M-559, Akron 18, Ohio.*

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

The wrong lubricant



"Stand and deliver," says the classic highwayman, right down through the years, call him Dick Turpin or Jesse James or any other name. But Dick or Jesse never robbed anyone as effectively as a coal mining machine that stands still and DOESN'T deliver coal . . . especially when such a holdup is caused by friction trouble due to faulty lubrication.

HULBURT OIL & GREASE COMPANY

PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

can rob you, too . . .

MAKE SURE YOU ARE PROPERLY PROTECTED!

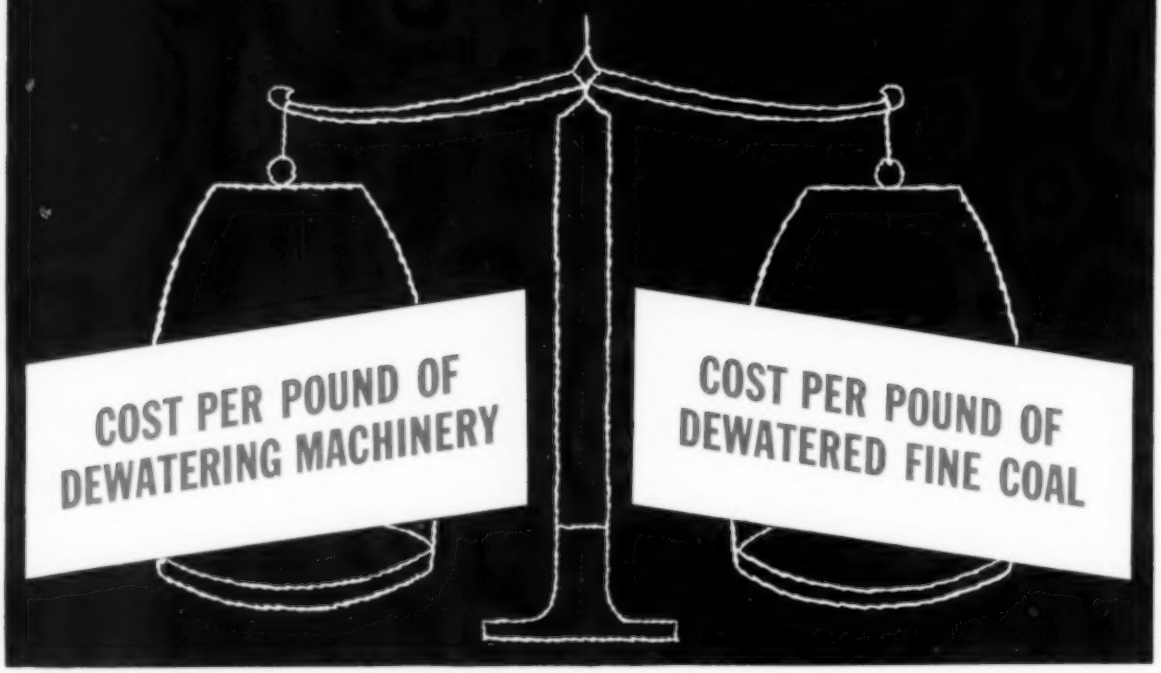


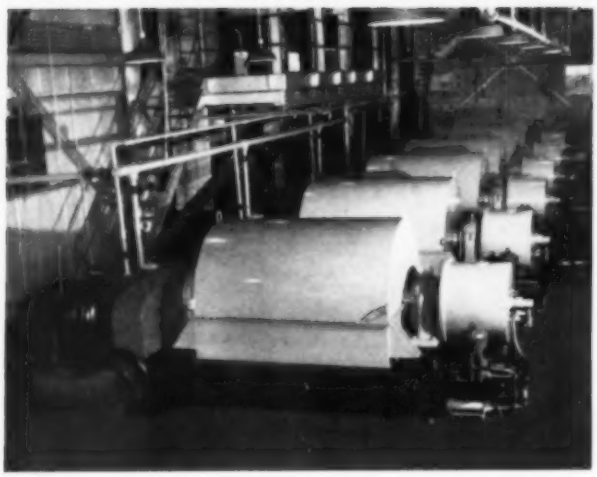
Hulburt

QUALITY LUBRICANTS

There's one name any coal operator can confidently call when he feels he's being robbed by friction—and that's HULBURT. Call Hulburt Engineering Service and you're sure your mining machines will keep on delivering low-cost tonnage. Call Hulburt and you protect the thousands of dollars you've got invested in such machines . . . because Hulburt Quality Lubricants are made specifically to do just one thing supremely well—i.e. keep friction from robbing coal mining machinery of power, speed and productivity. Hulburt products keep coal mining machinery MOVING and DELIVERING . . . better and longer.

Which interests you...?





What it costs you to dewater fine coal after it's washed is not the first cost of the equipment but first cost plus operating cost. This applies to plants washing as little as 100 tons or less per hour as well as plants of 2000 tons per hour or more capacity.

- Bird Coal Filters look mighty good to their users on this basis of net cost per pound of dewatered coal.
- One large operator who installed his first Bird ten years ago now has more than twenty on the job.
- Another put in four Birds eight years ago and now operates fifteen or more.
- These and similar records of repeat orders are to be found in plants employing all varieties of cleaning systems.

Bird Coal Filters deliver fine coal as dry as can be obtained by mechanical means at an overall cost so low that they warrant first consideration. Why not get the facts and figures as they apply to *your* plant?

BIRD MACHINE COMPANY • SOUTH WALPOLE, MASSACHUSETTS

Regional Offices: Evanston, Ill. • Portland, Oregon

BIRD COAL FILTERS

Coal Age

FEBRUARY • 1956

Editorial: Coal Resurgent 53

1955 Opens New Era of Expansion 54

How McGraw-Hill Economists See...Business in 1956— ROBERT P. ULIN, DORA K. MERRIS 61

Business Investment Holds Key To Both Growth and Stability 62

Mining Progress in 1955 64

Safety in 1955 72

1955 Sales of Mining Equipment— W. H. YOUNG, R. L. ANDERSON 74

The Coal Commentator 77

Revitalizing Program Pays Off At Delta Collieries 78

Making Suggestion Systems Work— ERNEST W. FAIR . . . 83

Better Mine Lighting— ROBERT R. GODARD, J. A. BOYLE 84

How Enoco Uses AC Power For Continuous Miners . . 88

Getting More from Portable Cable— WALTER THEODORE PEIRCE 94

Foremen's Forum: Your Son In A Mining Career? . . . 98

Operating Ideas 102

Equipment News & Bulletins . . 105 *News Roundup* 120

Coming in Coal Age . . .

• A feature article on the world uses of fuels and where coal stands in the picture. The overseas market for American coal doubled last year and from all indications will continue to operate at a brisk pace. The coming *Coal Age* feature will provide the mosaic to help you plan your continued participation in or entrance into the foreign market.

• Expanded and improved facilities at a western property are designed to help fill coke needs for the growing steel industry of the West. Continuous mining underground and preparation of a low-ash final product at maximum yield are themes of a coming story.

• Also on the agenda are descriptions of how ventilation can be planned ahead to serve growing properties, and of a modern preparation plant complete with mechanical and heat driers.

Review and Forecast

This issue of *Coal Age* is our traditional review of developments in the industry in the year just past. It will bring you up to date on coal's immediate past and 1956 prospects in marketing, production, purchases of equipment and safety.

On Our Cover:

The machine in the cover picture is a company-designed roof-bolting unit now in service at Buckhorn mine, Bell & Zoller Coal Co., Johnston City, Ill. A full description of operations at Buckhorn appears in *Coal Age*, December, 1955, p 50, and a full picture of modern roof-control equipment and methods can be found in the Mid-September *Coal Age Mining Guidebook*, beginning on p 29.

CARL COASH, Publisher — IVAN A. GIVEN, Editor

Harold Davis, Managing Editor — A. E. Flowers, Associate Editor — W. A. Raleigh Jr., Assistant Editor

Christopher Elias, Assistant Editor — F. A. Zimmerli, Assistant Editor (layout) — G. B. Bryant, Jr., Washington

William H. McNeal, Research Manager — Raymond H. Smalley, Business Manager

COAL AGE — FEBRUARY, 1956
VOLUME 61 — NUMBER 2

(with which are combined The Colliery Engineer and Mines and Minerals)

Published monthly on the 1st, with an additional issue in Mid-July by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Member ABC and ABP.

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Publication Office, 1309 Noble St., Philadelphia 23, Pa. Donald C. McGraw, President; Paul Montgomery, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising; J. E. Blackburn Jr., Vice President and Circulation Director.

Subscription: Address all correspondence to COAL AGE—Subscription Service, 330 W. 42nd St., New York 36, N. Y.

A McGRAW-HILL PUBLICATION

Member of Associated Business Publications and Audit Bureau of Circulations

Allow 1 month for change of address. Subscriptions are solicited only from management, production and maintenance executives and engineers in the coal mining industry. Position and company connection must be indicated on subscription orders.

Single Copies: U. S. and possessions and Canada, 50c; all other countries, $1.50.

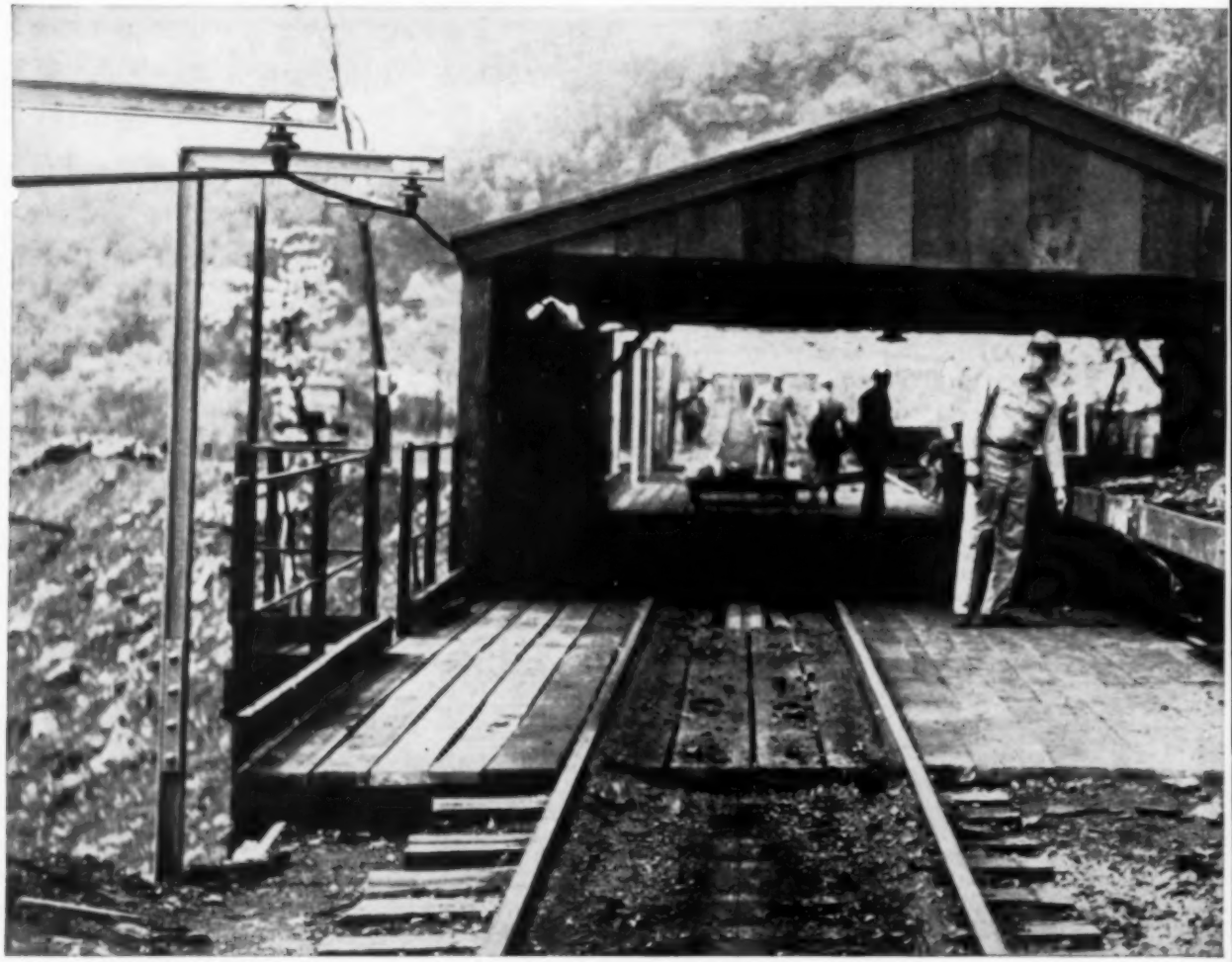
Subscription rates: United States and possessions and Canada, $3 for one year, $4 for two years, $5 for three years.

Other Western Hemisphere and the Philippines, $10 for one year, $16 for two years, $20 for three years. All other countries, $15 for one year, $28 for two years, $30 for three years.

Entered as second class matter May 4, 1951, at the Post Office, Philadelphia, Pa., under the Act of March 3, 1879. Printed in U.S.A. Contents Copyright 1956 by McGraw-Hill Publishing Co., Inc.—All rights reserved. **COAL AGE** articles are indexed regularly by Engineering Index, Inc. **COAL AGE's** own index is published annually in December.

Branch Offices and District Managers: Atlanta 3, S. T. Henry; Chicago 11, F. W. Roets and G. A. Mack; Cleveland 15, J. E. Lange; Dallas 1, J. H. Cash; Los Angeles 17, G. A. Fruhling; New York 36, H. C. Chellson, J. W. Patten (New Eng.); Philadelphia 3, J. B. Lewis; Pittsburgh 22, W. H. H. Ginder; St. Louis 1, P. W. Roets; San Francisco 4, J. W. Otterson; Washington 4, McGraw-Hill House, 95 Farrington St., London E. C. 4, H. Lagler.

News Bureau Offices: Atlanta 3; Cleveland 15; Detroit 26; Houston 25; San Francisco 4; Washington 4. **World News Offices:** London, Paris, Bonn, Tokyo, Bombay, Rio de Janeiro, Mexico City.



How Sanford-Day proved Olympian Grease best for mine car wheels

MINE CARS built by Sanford-Day Iron Works, Knoxville, Tennessee, are noted for their quality. Back in the late 1930's, Sanford-Day began equipping its car wheels with special floater-type ball bearings—and set out to find the grease that would give them the best and longest lasting protection.

Using a special test set-up that simulated the most adverse operating conditions, Sanford-Day com-

TUNE IN:
TEXACO STAR THEATER
starring
JIMMY DURANTE
on TV Saturday nights.
METROPOLITAN OPERA
radio broadcasts
Saturday afternoons.

TEXACO



pared *Texaco Olympian Grease* with well-known competitive greases—including two they had been using regularly.

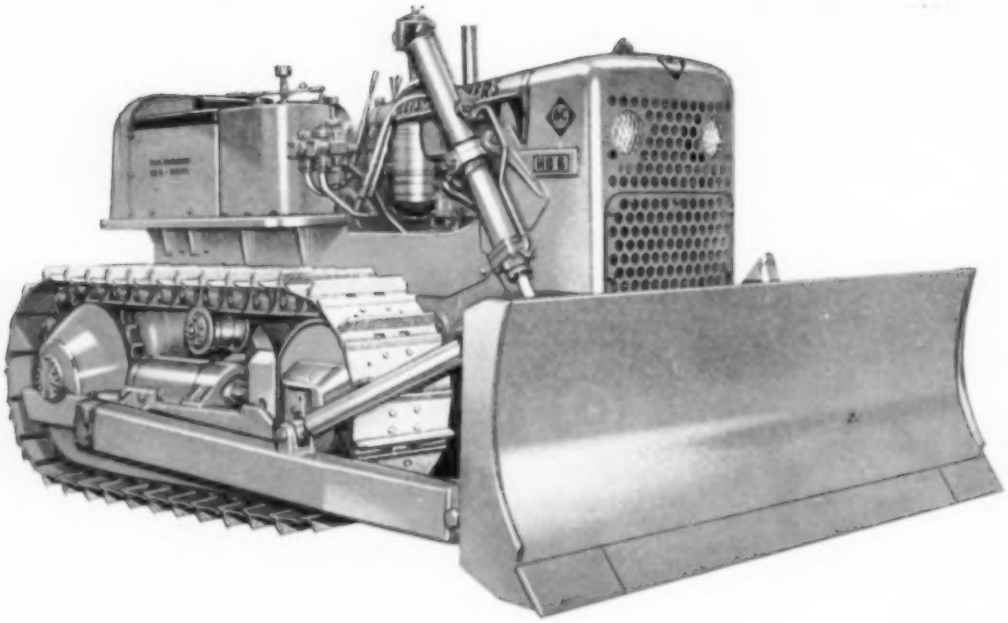
Texaco Olympian Grease clearly outperformed all competitive products in resistance to water-wash and leaking, prevention of wear, easy starting at low temperatures, load carrying capacity and uniform consistency over longer periods of use.

That is why, for over 15 years, all bearings on Sanford-Day cars have been factory-filled with *Texaco Olympian Grease* and why Sanford-Day recommends *Texaco Olympian Grease* for continued use in service.

Whatever the make of mine car or the type of wheel bearing—plain, cavity hub or anti-friction—you assure better lubrication and lower maintenance cost by using *Texaco Olympian Grease.* It is available in three consistencies to meet every requirement.

A Texaco Lubrication Engineer will gladly give you full details. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

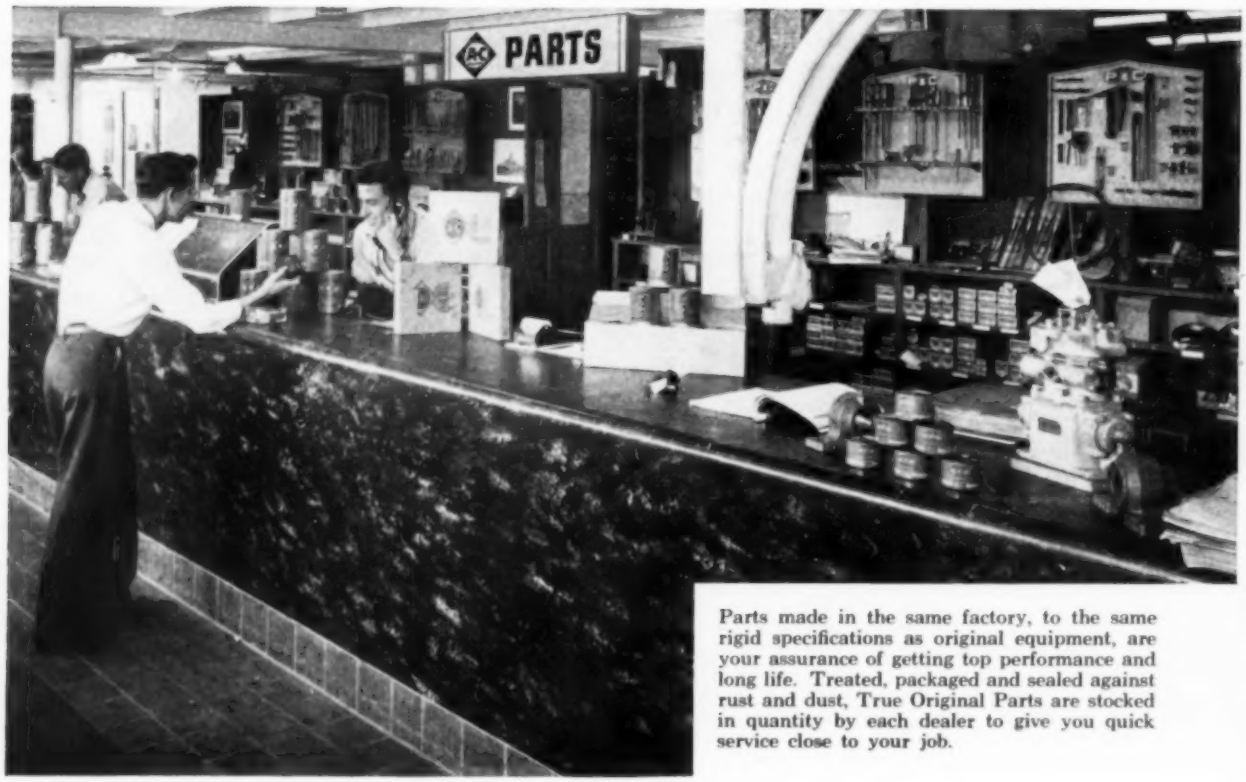
Lubricants and Fuels
FOR THE MINING INDUSTRY



You're always sure of

TRUE ORIGINAL PARTS

from your Allis-Chalmers dealer



Parts made in the same factory, to the same rigid specifications as original equipment, are your assurance of getting top performance and long life. Treated, packaged and sealed against rust and dust, True Original Parts are stocked in quantity by each dealer to give you quick service close to your job.



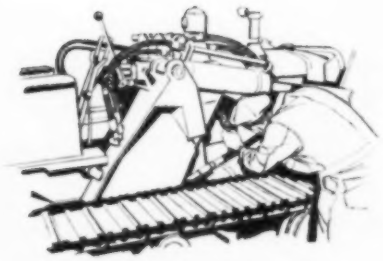
but not forgotten
by your Allis-Chalmers dealer

When you invest in Allis-Chalmers equipment, you are getting far more than just a modern machine. Your dealer offers you the opportunity to do a better job at lower cost. He wants your equipment to give A-1 performance day in and day out. His reputation depends on it.

That's why your Allis-Chalmers dealer puts so much importance on good preventive maintenance practices . . . encourages you to take full advantage of his modern servicing facilities.

and you can have confidence in his

FACTORY-TRAINED MECHANICS, FACTORY-APPROVED METHODS



IN THE SHOP

Specialized facilities include factory-approved tools and all necessary equipment for complete service. Factory-approved methods are used to save you time and money, assure finest workmanship.



ON THE JOB

Factory-trained servicemen are ready to help you, day or night. Their technical know-how and practical experience get the job finished fast . . . at lowest possible cost to you.

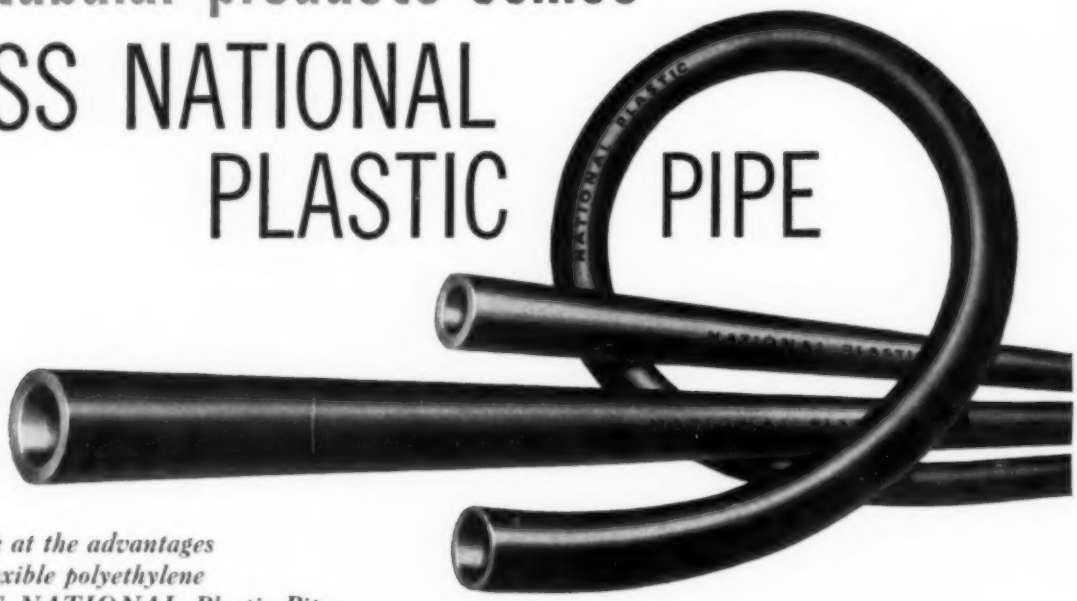
ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

From the world's foremost manufacturer of tubular products comes

USS NATIONAL PLASTIC PIPE



Look at the advantages of flexible polyethylene USS NATIONAL Plastic Pipe:

- Resists attack by rust, corrosion, acids, alkalies, salts, and other chemicals.
- Extremely tough—resists cracking and breaking due to rough handling, even at very low temperatures.
- Retains its toughness and flexibility over its entire working range from minus 90°F to plus 120°F.
- Lightweight, easy to carry, easy to handle—a 200-foot coil of 2-inch USS NATIONAL Plastic Pipe weighs only 86 pounds.
- Very low flow resistance, due to the smooth inside surface and non-wetting properties of polyethylene. Smooth interior also prevents the accumulation of deposits.
- Simple to install. The long continuous lengths of USS NATIONAL Plastic Pipe require few joints. When joints are used, they are of the insert type, quickly secured with stainless steel clamps. Light, flexible USS NATIONAL Plastic Pipe is easy to handle, thus requiring less installation time.



USS NATIONAL Plastic Pipe is available in sizes from ½-inch to 6 inches in diameter, in a variety of wall thicknesses. It is sold and serviced by the same distributor organizations that handle USS NATIONAL Steel Pipe. For further information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Ask for Bulletin No. 29.

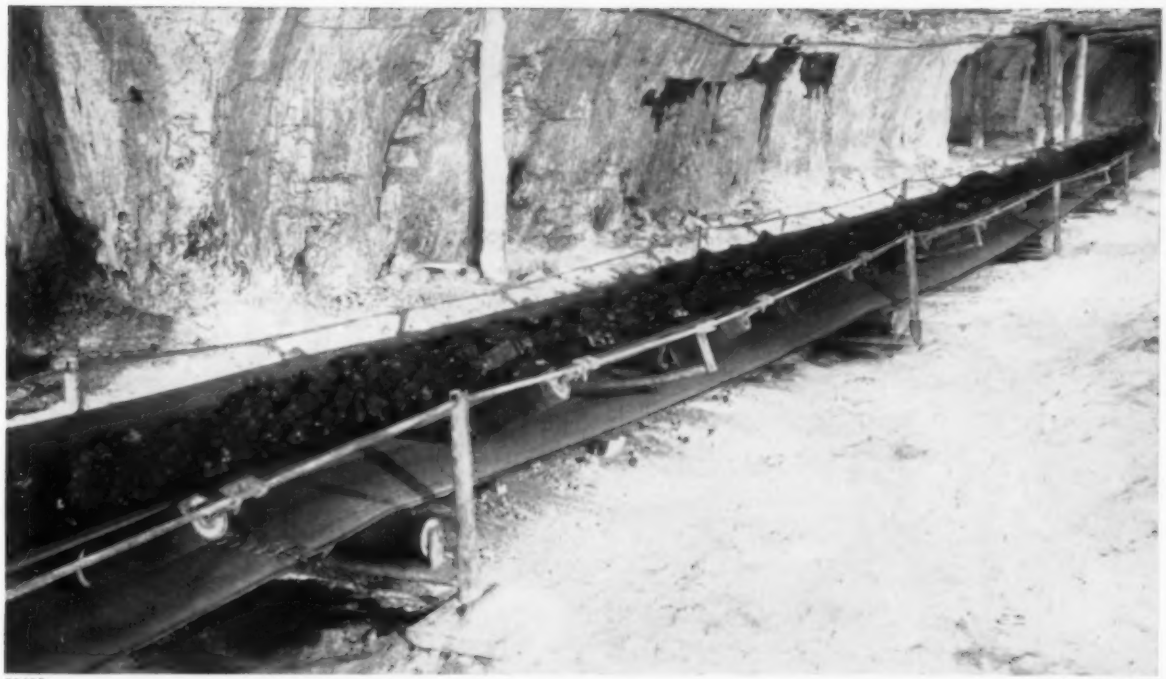
SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS NATIONAL *plastic* PIPE

UNITED STATES STEEL



21433

Patents Pending

You can extend this Goodman belt conveyor 150 ft. in less than ONE hour!

The entire operation of extending Goodman's NEW ***Rope Belt**** Conveyor a distance of 150 feet can be done in less than one hour—between shifts—with no loss in production time. And one shuttle car can easily carry all needed supplies.

Before you say "Impossible," study these facts. Goodman's NEW ***Rope Belt*** Conveyor completely eliminates rigid structural framing and fixed idlers. In their place, anchored parallel wire ropes carry flexible chain-linked idlers over which the belt travels. With tail section advanced and a new length of belting spliced on, it's no trick to tension ropes by turn-buckles at head and tail ends. Lightweight supporting stands take but little time to position. A few minutes more to clamp linked idler assemblies to ropes and place return belt idlers at supporting stands . . . then, start the coal moving!

Belt and idlers last months longer as the flexible Goodman system conforms *to* the load rather than the load struggling to conform to a fixed contour belt. Spillage is negligible as the belt "cups" with the load. There's no accumulated coal to rip the belt or cause hazardous friction. Idlers never foul. And each roller automatically exerts an aligning action—regardless of varying loads or off-center loading, idlers hold the belt in alignment.

It won't cost you a penny to get full details on the NEW Goodman ***Rope Belt*** Conveyor . . . and, it may save your company thousands of dollars. Phone, wire or write today . . . no obligation.

21438



21439



As load passes, wire rope spans and idler assemblies "give" with the weight absorbing shock of load travel.

GOODMAN

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS

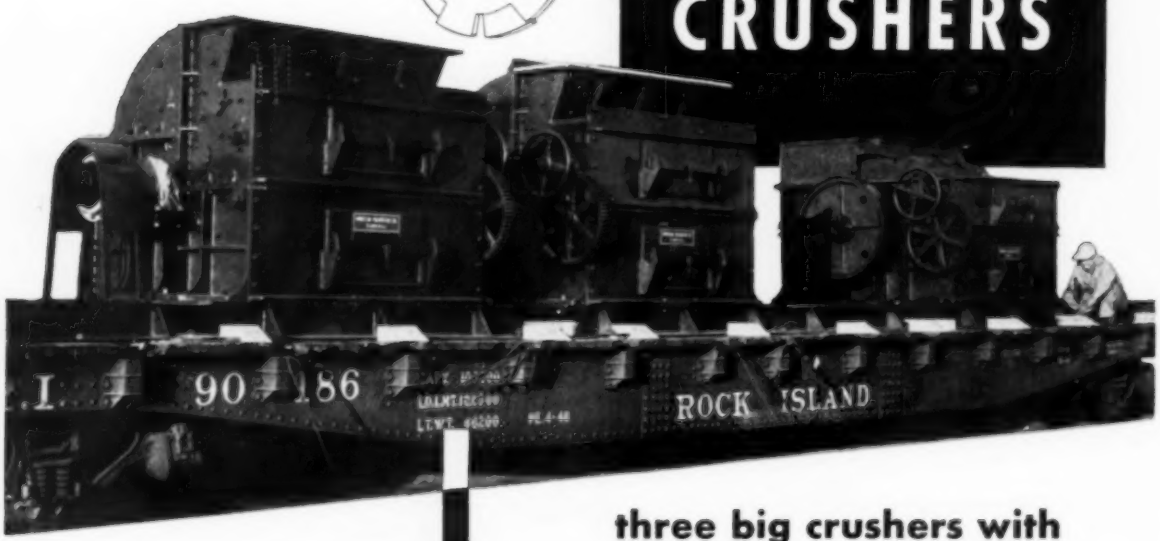
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

*Trademark

on their way
to better
coal preparation

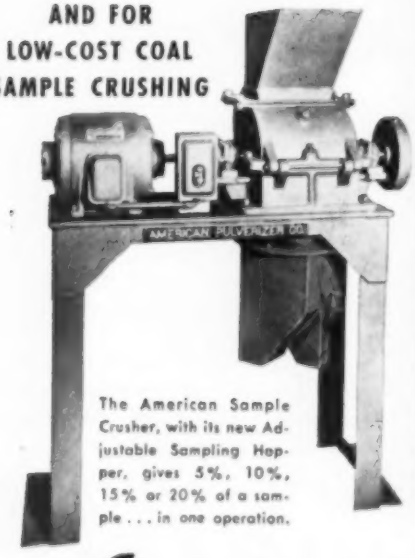
COAL IS SPLIT
-NOT CRUSHED

"AC"
ROLLING RING
COAL CRUSHERS



three big crushers with
the 'BIG THREE' advantages

AND FOR
LOW-COST COAL
SAMPLE CRUSHING



The American Sample Crusher, with its new Adjustable Sampling Hopper, gives 5%, 10%, 15% or 20% of a sample . . . in one operation.

1 **BETTER REDUCTION.** The exclusive American Rolling Ring reduction principle . . . designed to *split* coal instead of crushing it. Result: *controlled uniformity* in all coal reduction.

2 **HIGHER TONNAGE.** A "big appetite" (up to 800 t.p.h., depending on size of feed and product desired) in a *compact unit* with minimum headroom requirements for easier installation.

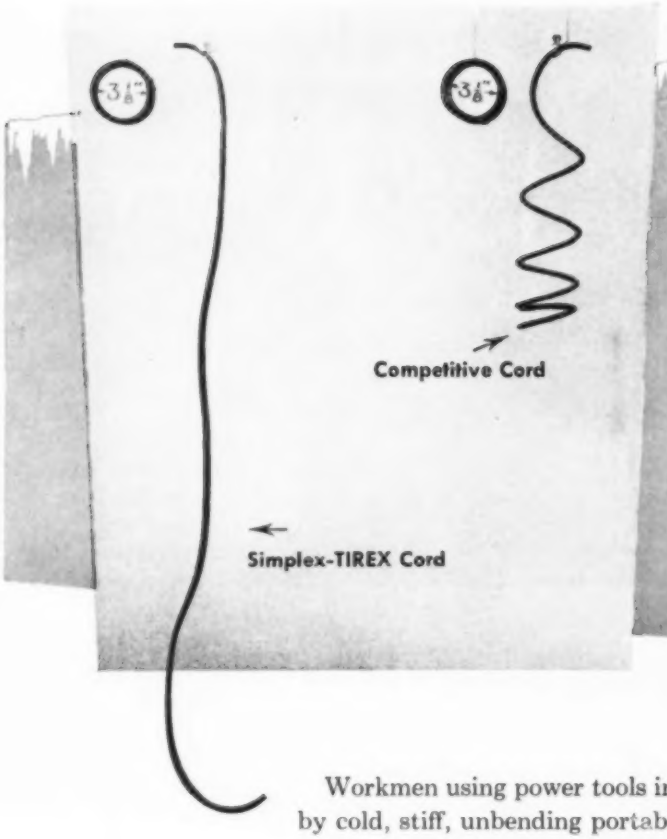
3 **LOWER MAINTENANCE.** Not a mere claim, but actual performance, backed by the operation records of scores of coal mines and power plants all over the country—records that prove Americans operate at a *total cost of less than 1¢ per ton of coal crushed!*

● ***WANT MORE INFORMATION***
on better coal preparation?
Write for Bulletin AC.

American
PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Ave., St. Louis 10, Mo.



"Deep Freeze" tests prove Simplex-TIREX Cords stay more pliable when cold!

Workmen using power tools in winter weather find their work hampered by cold, stiff, unbending portable cords.

Recent tests show that Simplex-TIREX Cords are three times more pliable than other cords when cold.

Here is what we mean.

Two 5-foot lengths of 2-conductor No. 18 SJO cord were wrapped around a 3⅛-inch steel mandrel. One cord was TIREX and the other was a competitor's.

Both samples were locked up in a refrigerator for one month at 36°F.

They were attached to the panel while still in the walk-in refrigerator. The panel was carried outside and immediately photographed. Notice the results. TIREX, on the left, is limp and pliable. The other cord looks like a coiled spring.

Which would you want on your portable tools? You can get genuine TIREX from your electrical distributor.

Simplex

TIREX

SIMPLEX WIRE & CABLE CO.
79 Sidney Street, Cambridge 39, Massachusetts



IT'S A **Skid-Shovel**

with Drott's exclusive *triple-power*, pry-over-shoe break-out action—plus 42° ground-level bucket roll-back! The Skid-Shovel position also gives you speedy straight-forward loading—time-gaining, strain-saving Skid-Shoe load transport!

EXCLUSIVE NEW 2¼-YARD *gives you 4-machine utility ...*



IT'S A **Clamshell**

a "wide-opener" that gives you a speedy bucket-fill on stockpiled loose materials, even in cramped quarters. And as a clamshell, the Four-In-One gives you a 30-inch dumping height advantage over ordinary roll-forward bucket dumping.



Move the Four-In-One "machine-selector" lever with finger-tip ease, and prove ***versatility unlimited*** . . . get the job-range of a machinery yard full of costly, limited-duty rigs! Test the tremendous excavating power of exclusive pry-over-skid-shoe break-out action. Compare how exclusive shock-swallowing Hydro-Spring speeds production, protects performance. Try this big new 2¼-yard Four-In-One, or the TD-6 one-yard or TD-9 1½-yard model. Ask your nearby International Drott distributor for a demonstration!



IT'S A **Bullclam**

with famous Drott Bullclam Shovel efficiency on all Sanitary Landfill operations—*plus* unequalled ability to *strip, grade,* and *spread,* using clam lip control. And as a Bullclam, the Four-In-One can *self-load* like a carry-type scraper!

TD-14 FOUR-IN-ONE

for one moderate investment!



IT'S A **Bulldozer**

with clam open in bulldozing position, the big-capacity earth-rolling blade has cutting edge and shoes on the ground. You regulate depth of cut with ease and accuracy by hydraulic "radius control" of blade pitch (forward and backward).

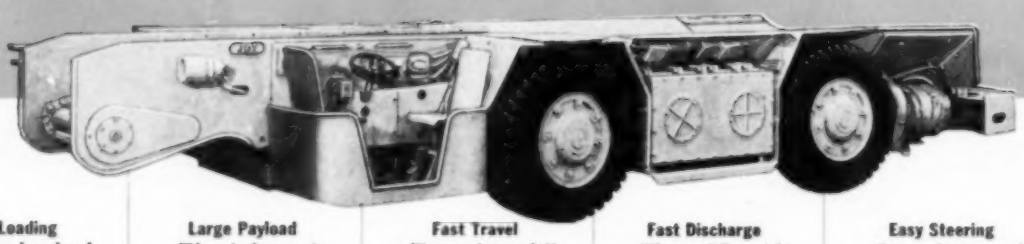
International Harvester Company, Chicago 1, Illinois

INTERNATIONAL®

DROTT

There's a Valuable Combination





Fast Loading

Sides and ends of the specially designed 9-SC body are just right for easy positioning behind loader boom or surge car. Two-speed, resistance-free operation of motors makes loading easy and fast.

Large Payload

The job-engineered 9-SC packs up to 8 tons of coal per trip. Its rugged body rides on axles, wheels and tires all rated well within load requirements. It is built right to carry big loads dependably.

Fast Travel

Tramming a full load at 3.6 mph, then returning empty at over 4 mph, the Joy 9-SC with 10 HP motors keeps your coal on the move. No time lost due to skidding, tangled cable, burned out resistors, etc.

Fast Discharge

The 9-SC, with hydraulic adjustable discharge, gets rid of a full load in less than a minute. Powerful motors and specially designed, heavy-duty conveyor chain and flights make sure loads continue to empty fast.

Easy Steering

Joy pioneered power steering underground, long before autos had it. The 9-SC now has power-boosted steering that's better and easier than ever. Mechanical steering system is provided, just in case it's needed.

Simple Control

Easy-to-reach controls operate the 9-SC through Joy's positive, trouble-free Magnetax Control. You steer with a familiar wheel from a comfortable seat; brake with your right foot; tram with your left.

Positive Braking

Big airplane-type, hydraulic disc brakes control all four wheels and stay effective, smooth and easy despite coal dust, oil and water. No need to adjust; can be relined in just a few minutes with ordinary tools.

Proved Performance

Nearly 20 years ago, Joy introduced the world's first shuttle car. The 9-SC is one of the most successful in the line, consistently doing a good, dependable job and setting new records in many mines.

Low Maintenance

Basically a modified version of the field-proved 10-SC, the improvements in the 9-SC give you even greater assurance of *continued* service without breakdowns . . . keep it on the go, and maintenance low.

Less Hauling Cost

The 9-SC is a performance-proved car, not a "drawing-board dream" or a test unit. It's ready to work immediately, and many mines have already reported operating costs of much less than 2c a ton.

of Haulage Advantages for you in the JOY 9-SC SHUTTLE CAR



THE JOY 9-SC Shuttle Car is an ideal unit for the operator who wants high-production haulage at lower first cost—or for use in mines where the service conditions may not be tough enough to require the extra ruggedness of the popular JOY 10-SC.

In the 9-SC, you get a permissible unit that offers many of the best features of the heavier 10-SC, at considerably less cost. The 9-SC Shuttle Car handles payloads up to 8 tons, trams loaded at 3.6 mph, and discharges in 40 to 45 seconds. It is 7′8″ wide and available in 43½″ or 49½″ basic heights—with 4″, 6″ or 8″ sideboards, and 34″, 46″ or 58″ discharge lengths for 250V or 500V-DC operation.

Here is a field-proved shuttle car that can tram a full load up or down a 12% grade, turn on the grade without skidding, and handle coal or rock with equal ease. It has simple, familiar controls—the driver steers with a wheel and brakes with his right foot, going or coming back.

As further assurance that the 9-SC was designed for continuous service under tough conditions, it has the same heavy-duty universal wheel drive units with positive drive (no differential) as the model 10-SC . . . the same heavy-duty spur gear reducers and constant velocity universal joints on the traction drive . . . the same rugged, equalized drag link steering (no tie rods)—and many other identical features, both standard and optional.

Check up on the 9-SC for dependable haulage in medium to thick seams. For *any* haulage problem or other underground requirement, JOY Mining Equipment offers you the field-proved way to boost production and reduce costs. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 41-1

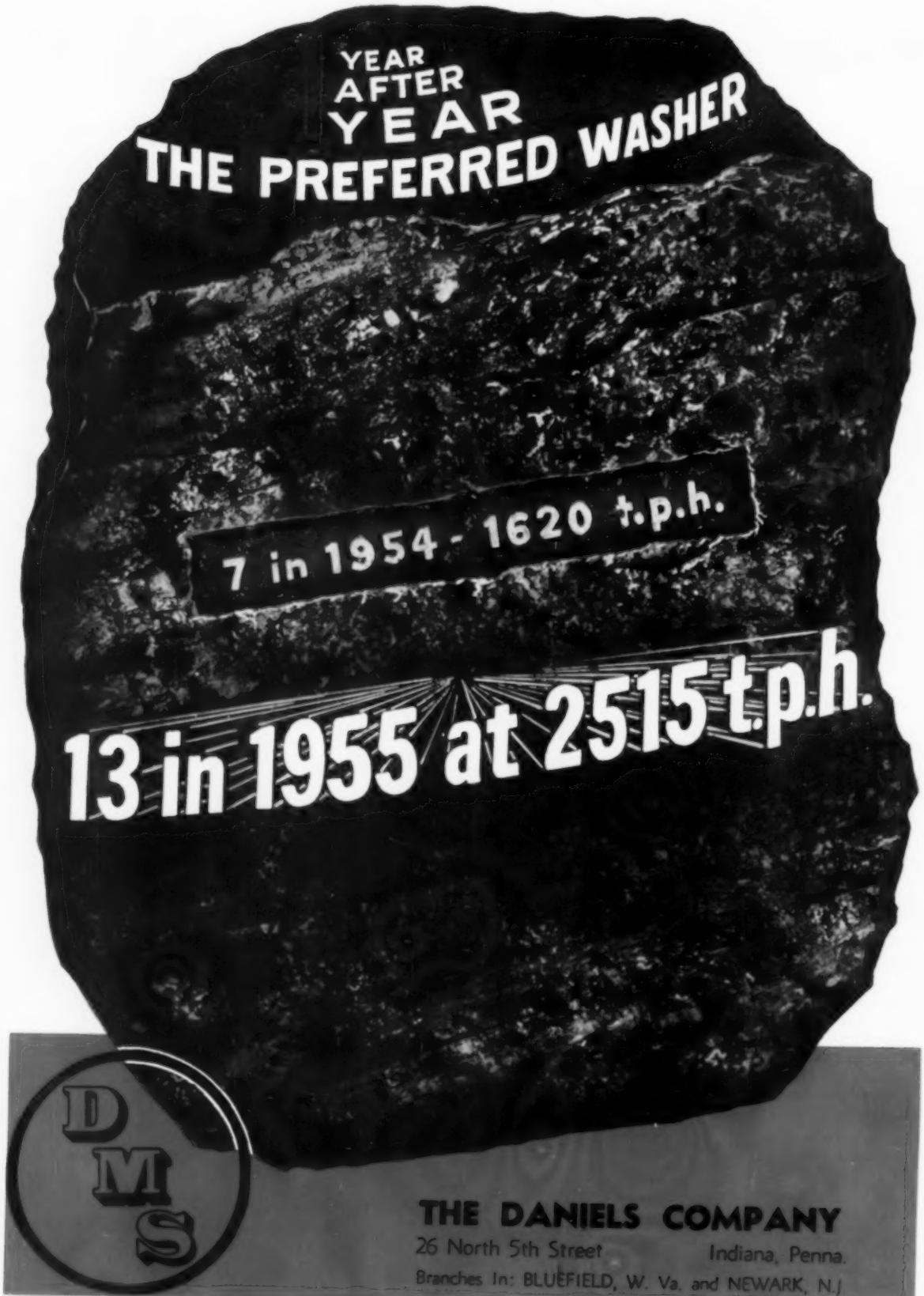


Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

WSW CL5918-41


YEAR
AFTER
YEAR
THE PREFERRED WASHER
7 in 1954 - 1620 t.p.h.
13 in 1955 at 2515 t.p.h.
D
M
S
THE DANIELS COMPANY
26 North 5th Street
Indiana, Penna.
Branches In: BLUEFIELD, W. Va. and NEWARK, N.J.

Why the Big "B" Rear-Dump



can cut your hauling costs

Speeds to 34 mph

The new 35-ton capacity B Tournapull Rear-Dump has 10 forward speeds, from 2 mph to 34 mph . . . 2 reverse speeds, 2 and 4 mph. Rapid shift and quick acceleration of 293 hp diesel engine lets you move faster and easier into higher gear ranges.

Improved gradability

Proper distribution of weight forward onto drive wheels allows "B" to go up steep grades.



Fast loading

Large "target" area makes loading fast and simple. Bowl is 17′8″ long, 10′2″ wide, has maximum depth of 7′6″. Rear of body provides wide, low entry which gives excavator faster loadings.

Fingertip control of dumping

The touch of a switch, activates hoist motor to lift body. As body lifts quickly, it swings behind rear wheels to dump clean. Completely streamlined bowl sheds material readily. There is positive control both up and down.

Rugged Construction

Body is heavy steel plate, rigidly reinforced. Three layer bottom consists of heavy bottom plate, thick steel billets and heat treated steel strips to resist wear. Main case of prime-mover is built extra strong . . . will not distort to put strain on power-train.

No hydraulics, springs or hinged steering connections

Problems of conventional rear-dumps are eliminated by simple design of "B" Rear-Dump. Troublesome hydraulics, long driveshafts, springs, spring hangers and hinged steering connections are eliminated. Improved hauler means higher mechanical efficiency and lower maintenance costs on all hauling jobs.

See your LeTourneau-Westinghouse Distributor about the new "B" Rear-Dump today. He can also show you how this unit can be interchanged with a Scraper or Crane, at only about 25% of original total price.

Tournapull—Trademark Reg. U.S. Pat. Off. BR-889-G-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company



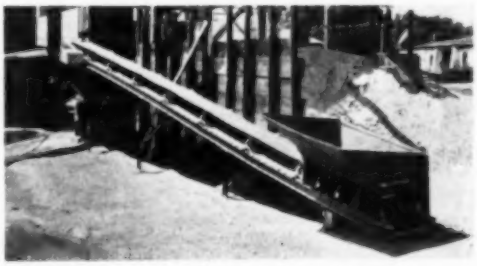
LONG HAUL—Even the longest Barber-Greene Conveyors are built of standardized components . . . produced on a precision, quantity production basis. They can be assembled in almost limitless combinations to cut the time and cost of any material handling job.

Long or short haul—it costs less to move materials with belt conveyors

Thousands of installations—ranging from a few feet to thousands of feet—prove that belt conveyors move bulk material at lowest cost.

No other machine is so simple in construction or requires so little maintenance. No other machine can deliver such high hourly capacities with so little power or attention.

Barber-Greene has given a new meaning to belt conveyor economy. Built of standardized components, Barber-Greene Conveyors are delivered sooner . . . require less engineering . . . are erected faster . . . give top performance . . . and are more easily altered to meet changing or expanding requirements. Being standardized, repair parts are readily available—usually from the stock of your local distributor.



SHORT HAUL—Even the shortest Barber-Greene Conveyors are available in standardized components in the width and length to suit your needs. These small conveyors provide the economical way to handle the widest range of materials with greatest flexibility.

56-7-PE

Send for this 192-page conveyor book. It's comprehensive, easy to use.
Write for Catalog 76-A on your company letterhead.



Barber-Greene BG
AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT



Tournatractor

handles stepped-up coal demands for big power plant

- ***Dozes and maintains stockpile***
- ***Handles odd job assignments***



Since new 50,000 and 62,500 kilowatt generators have been installed at the Wisconsin Public Service Corporation, Green Bay, Wisconsin, coal demands have been steadily increasing year after year. To help fulfill these stepped-up coal requirements, one rubber-tired Tournatractor helps keep stockpiles hard-packed and dressed to insure speedy loading operations.

240′ cycle every 55 seconds

Here's how Tournatractor performs around stockpile: Dozing in second and third gear, tractor-on-rubber pushes big 2½-yard loads on 240′ cycle every 55 seconds. As rig speeds over cycle distance, its big 24:00 x 25 low-pressure tires compact coal without crushing, and reduce possibilities of spontaneous combustion.

Tournatractor builds emergency stockpile

Besides handling dozing duties for most of the 449,000 tons of coal used in generating 940,864,000 kilowatt hours of power, Tournatractor and a 148 hp crawler were given the job of building a 28,000-ton emergency stockpile. Location of new pile required coal to be dozed an average of 900′. Working these 1800′ cycles, Tournatractor dozed 10 capacity loads every hour.

Ideal Utility Tool

When production work is completed, Tournatractor is ideal for odd job assignments. At a moment's notice it can run over to crane to doze coal for loading operations, be sent to push railroad cars, clean up around yard and docks, plow snow from roads or 200-car parking area in winter, and handle numerous other hit-and-run assignments.

If you're interested in cutting coal handling costs, and reducing scattered job worries, it will pay you to see the Tournatractor in action. Call your LeTourneau-Westinghouse Distributor . . . he'll be glad to give you a demonstration on your next job. There's no obligation.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-851-CH-b

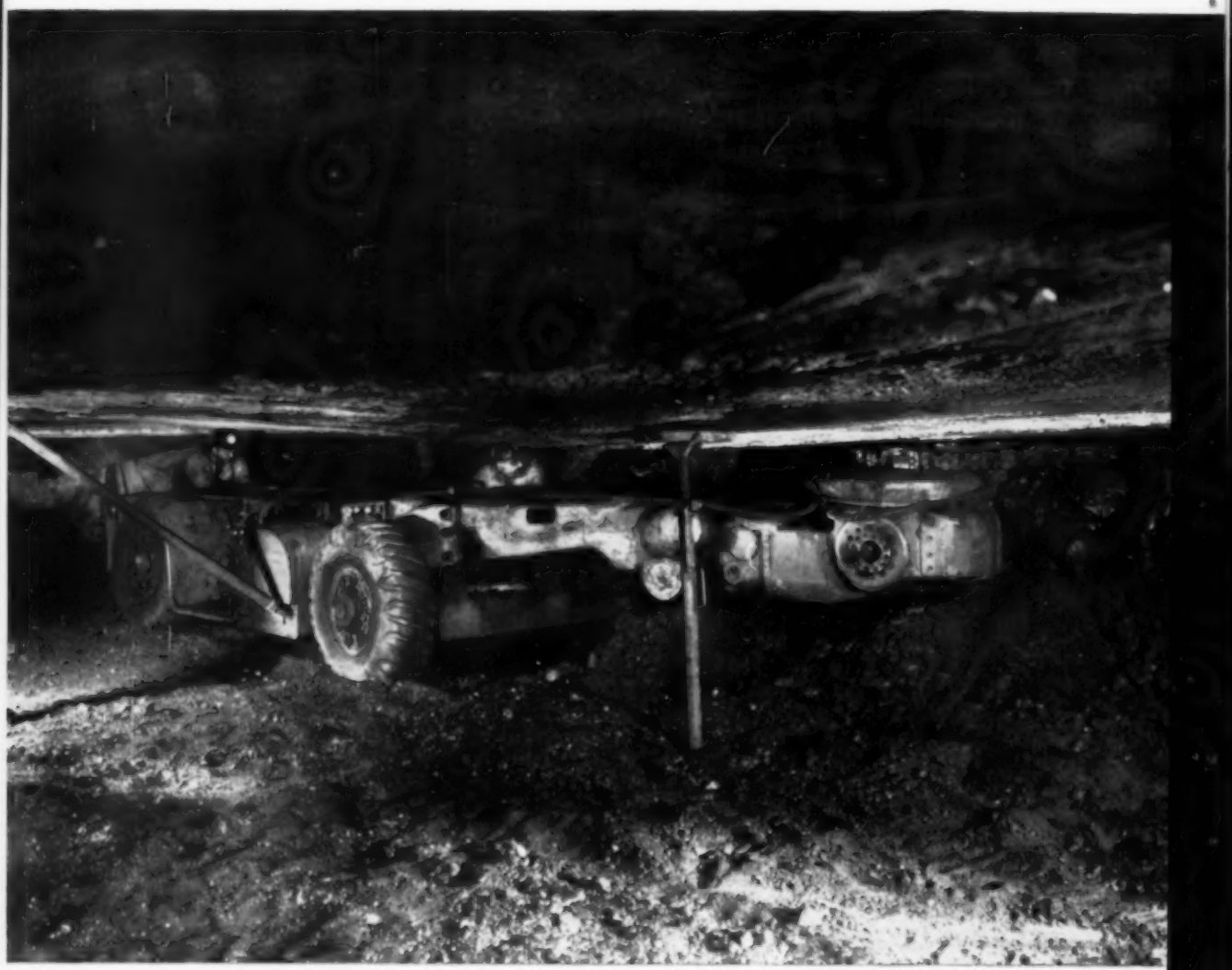
LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

push your coal production UP

with this hard-working JEFFREY team



Jeffrey 70-UR Universal Cutter for bottom, top and shear cuts

Head and cutter can be rotated 360° in either direction and positioned to make any kind of cut, any place in the seam. From one location, the 70-UR Cutter makes a 30-foot horizontal cut (using a 9-foot cutter bar) or a shearing cut 5'5" to either side of the machine's centerline. No wonder mine superintendents brag about its tonnage-producing ability!

Operators report smooth and positive traction for sumping, even when cutting at extreme range. The 70-UR's wide wheel gauge, long wheel base, low center of gravity and large pneumatic tires give sure-footed stability. Maintenance men say that its rugged construction reduces downtime and cuts upkeep costs.



Jeffrey 81-A Loader for high capacity loading

From both a production and a maintenance standpoint, the 81-A Loader is a superior machine. It is well balanced and flexible, and is easily maneuvered; trams at 137 FPM and can be turned in its own length. The conveyor swings 45° either side of center and elevates properly to load shuttle cars on the straight and in break-throughs. It has a rated capacity of 8 TPM and a maximum capacity of 10 TPM.

Maintenance is simplified on the Jeffrey 81-A Loader because every motor and gear case is a separate, detachable unit. This kind of unit construction is used throughout, resulting in rapid replacements and lower upkeep costs.



Jeffrey 56-FHR Face Drill for shot hole drilling

This single-boom drill provides a high degree of operating flexibility. It is rubber-tire-mounted and self-propelled by two hydraulic motors. Another operates the cable reel. The drilling head can be swung by finger-tip control to any desired position for shot hole placement. Drilling range is 7'2⅝" vertically and 13'1¾" horizontally.

The auger can be withdrawn by power without reversing the direction of rotation of the auger. This action clears the hole of all cuttings, leaving it ready for insertion of the powder or blasting cartridge.

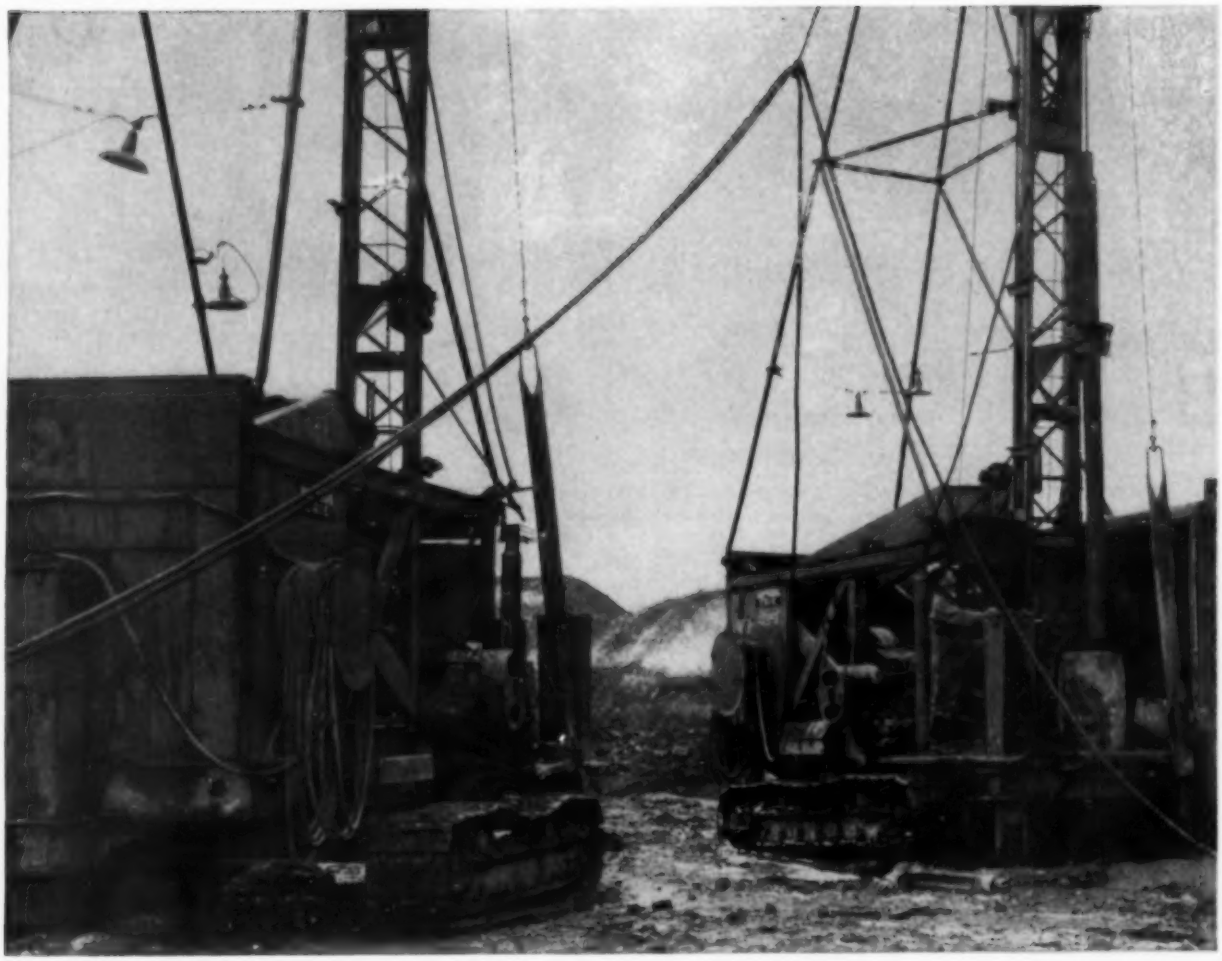
OTHER JEFFREY EQUIPMENT FOR UNDERGROUND SERVICE:

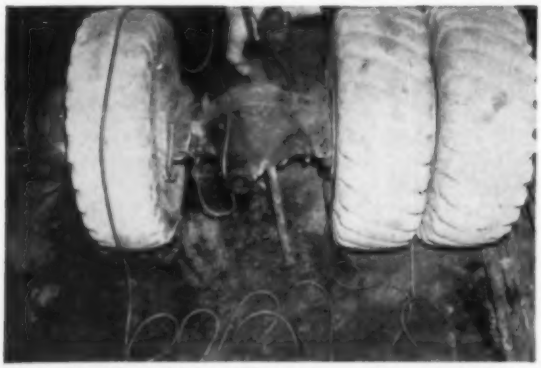
Continuous Mining Machines • Conveyors • Shuttle Cars • Locomotives • Fans and Blowers
Descriptive literature sent upon request. The Jeffrey Manufacturing Co., Columbus 16, Ohio

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

Tiger Brand Amerclad
in this





Extra flexible welding cable is shown. Fine stranded construction eases strain on operators' wrists.



Notice the flexibility. Tiger Brand is easy to handle.

does the three big jobs high production strip mine



Imagine the worst possible environment for electrical cable, and you'll find it at the strip mine shown in these pictures. The operators are plagued with underground fires, so severe that they have ruined the plastic windows in some of the power shovels. The rocks get so hot that you can't touch them or walk on them.

Despite the heat, the Tiger Brand Amerclad cable lies on the ground day in and day out, delivering dependable power 21¾ hours every day.

They do a lot of blasting at this mine, too. Although they try to protect the cable, it is pounded by large, sharp rocks almost every time there is a blast. Yet, when the pictures were taken, all the original cable was still in use, after *12 solid years of service.*

The mine owners point out that when a cable fails it costs money in down-time and replacement. The clincher is this: every foot of shovel cable, welding cable and drilling cable in the mine is Tiger Brand Amerclad.

Roughhouse service. That cable slung in the air and coiled on the sides of the drills is all Tiger Brand Amerclad.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL
GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB

- asbestos wire and cable
- paper & varnished cambric cable
- mold cured portable cord
- machine tool & building wire
- shovel & dredge cable
- special purpose wire & cable
- aerial, underground and submarine cable

USS Tiger Brand **ELECTRICAL WIRE & CABLE**

UNITED STATES STEEL

How to CUT CLEARING COSTS

To help you clear land faster and cheaper, here are NEW IDEAS developed by clearing specialist Wade Lahar Construction Co. These "tricks" will help Lahar and their 22 International tractors finish a 23,500-acre job at Buford Dam 7 months ahead of an 18-month schedule.



One pass levels 18-inch trees—Where clearing to ground level is your primary job, Contractor Lahar recommends a big International tractor and V-shaped cutter. The cutter shown was designed and built by Herman Hackler, project manager, at Lahar's home plant in Mountain Home, Arkansas. Four 200 hp International TD-24's, so equipped, are handling most of the Buford Dam reservoir clearing near Atlanta, Georgia. In typical operation, they cut over so much land that 18 other International tractors are



1-to-5 slopes, 1,300 acres per month—Your TD-24 will efficiently clear trees from steep grades as well as from level ground. Here's what Herman Hackler, project manager for Lahar on the $1,611,560 contract, says about this big 200 hp, 8 mph crawler: "TD-24's high-low steering range keeps cutter against the tree until it falls, even on steepest slopes. This factor, plus the "24's" great power, excellent traction, and over-all balance, is letting us crawler-cut 99% of our Buford Dam job, despite slopes averaging 1-to-5, and, in some places, 1-to-4. Our fleet of *22 International tractors*—11 TD-24's (four of them with cutters), six TD-18's, three TD-14's, and two TD-9's—clears and rakes 1,300 acres per month. This production, in our opinion, could not be exceeded by any other make of tractor!"



Burn, turn with one tractor—On big jobs, Mr. Lahar suggests use of one medium-sized tractor to handle burning of brush piles. This leaves bigger machines free for production work. Note how clear the raked ground is behind tractor. When Lahar's job is done, some 14,000 acres will be completely cleared; about 9,400 acres partly cleared, with some trees left standing in the water to benefit future water life.



Team decking boosts output—Where terrain permits, three to six of Lahar's 22 IH crawlers team to rake and pile the cut brush and trees. This gives two advantages . . . (1) rakes, by catching both ends of fallen trees and brush, pick up material lying between tractors which normally would require separate pass . . . (2) one pass per team is all that's needed to provide a clean swath.





kept busy decking and burning. One pass of their 13-ft long, 14-ft wide blade slices saw-like through brush, pine, and mixed hardwoods up to 18 inches in diameter. For scattered trees up to 12 inches in diameter, a similar though smaller cutter is used on a 66 dhp International TD-14A. Both TD-24 and TD-14 have a canopy of 2 and 2½-inch pipe. This protects operator and machine. Entire canopy and cutter assembly pins to regular A-frame . . . can be quickly detached and interchanged with standard or other special blades.

Blade "saws" larger trees—If your clearing work involves trees larger than 18 inches, here's another idea from Wade Lahar Construction Co. Using same mild-steel cutter blade as on smaller trees, have TD-24 operator "see-saw" back and forth a few times to cut the trunk. Just a few seconds' work with the 64,000-lb TD-24 will topple the tree.







Careful in-the-field maintenance boosts output, too. Left, mechanic uses compressed air to blow dirt and leaves from TD-24 radiator core. Right, special steel tooth, 2½ ft long with 18-inch overhang, is welded to TD-24 blade. Four teeth and top blade extension are used per raking tractor.

Winches logs from swamp—Clearing from marshy areas may present you with quite a problem too. Wade Lahar Construction Co does this work, 1% of their 23,500-acre Corps of Engineer job, with chain saw crews and winch-equipped TD-9 and TD-18 crawlers. After winching in, tractors skid timber to central area.

International

makes every load a pay load

INTERNATIONAL HARVESTER

Industrial Power

INTERNATIONAL HARVESTER CO., 180 N. MICHIGAN AVE., CHICAGO 1, ILL.

A machine size for every job . . . see your nearest INTERNATIONAL INDUSTRIAL POWER DISTRIBUTOR for details.









SCRAPERS 13 yds. and 18½ yds.

CRAWLER TRACTORS 8 Models . . 40 to 200 hp

DIESEL, GAS ENGINES 10 Models. 16½ to 200 hp

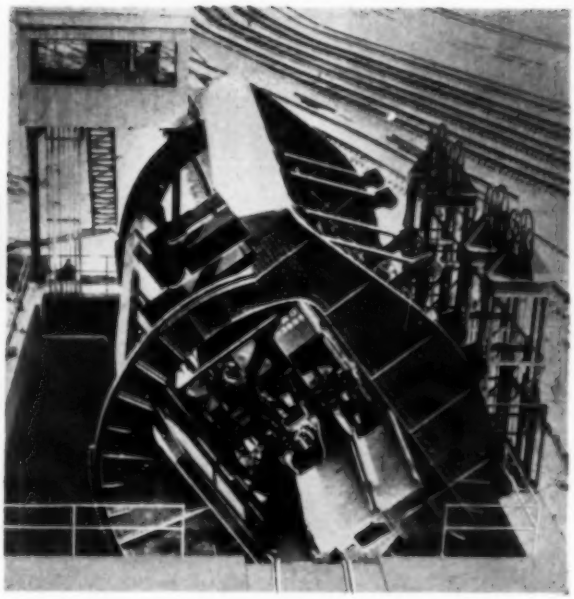
WHEEL TRACTORS 6 Models . . . 9 to 59 dbp

ALSO: International Draft Loaders . . . International Scrapers, Bottom-Dump Wagons . . . International Superior Pipe-Boom Tractors . . . and International Trucks.

From Design to Successful Operation... You can depend on

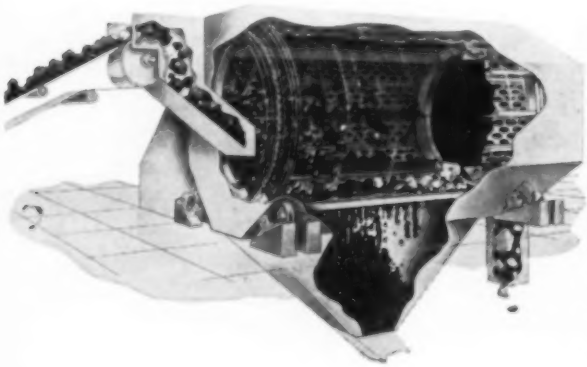
Heyl & Patterson

For Heavy Materials Handling Equipment



H & P Rotary Car Dumper

For handling up to 120-Ton Capacity Hoppers or Gondola Cars, these completely automatic one-man operated dumpers can be built in 2, 3 or 4 clamp design. The Automatic Car Clamps may be operated by mechanism contained on the Dumper itself or by counterweights. Optional features include Car Retarder on platen and platen-mounted scales.



H & P Bradford Coal Breaker

It serves as a preliminary coal cleaner relieving preparation plants or power plants of handling the large impurities in the raw coal. The Breaker shown has Open Ends equipped with steel tires which run on four rollers mounted on axles with anti-friction bearings. It can also be built as a Trunnion type. The Breaker can be of gear-driven design or as shown . . . driven by a motor through a gear reducer and a chain transmission to the periphery of the Breaker.

HEYL & PATTERSON EQUIPMENT FOR THE COAL INDUSTRY

Bradford Coal Breakers
Car Dumpers: Rotary Railroad
Rotary Mine
Coal Crushers
Conveying Systems
Mine Car Handling Equipment
Preparation Plants
Refuse Disposal Cars
Reineveld Centrifugal Dryers
Thermal Dryers
Thorsten Sampling Systems
Water Clarification Systems
Wet Cyclones:
Classifiers and Thickeners

Phone COurt 1-0750
For a Heyl & Patterson
Engineer To Consult
With Your Engineers

Heyl & Patterson
INC.
55 FORT PITT BLVD. • PITTSBURGH 22, PA.

NOW...a new LONG development

for faster, easier conveyor moves...

LONG
self-tramming
CONVEYOR DRIVE



It's this easy to move the LONG Conveyor Drive

Reduces moving time by as much as 60%!

With this unique mobile unit, conveyor moves are greatly simplified—and can be made in only a fraction of the time formerly required.

Because this LONG conveyor drive is crawler-mounted and self-tramming, one man can move it to a new location in a matter of minutes without any trouble or effort whatsoever. In addition, positioning time is greatly reduced as this can be done by power instead of manually.

For tramming, this new design uses a simple hydraulic system driven by the conveyor motor itself. Tramming speed is approximately 50 feet per minute, capacity of 5 TPM is standard, and operating lengths to 500 feet are practical. Models are available in a full range of capacities to meet individual requirements and are furnished with either LONG standard or solid return-trough pans.

For complete details or a demonstration, write us today.

The **LONG** Company
OAK HILL, W. VA.

America's foremost manufacturer of chain conveyor equipment



MAXIMUM DEPENDABILITY of the mine roof is carried right up to the working face, thanks to use of Republic Mine Roof Bolts. Track-mounted equipment has been removed to allow photograph to be taken.

BEST ALL-AROUND PERFORMANCE is provided by these two Republic Mine Roof Bolts. On the right, the square head bolt with wedge nut and shell is ideal for low roof areas by eliminating protruding-threads hazard. On the left, the forged wedge head bolt . . . perfectly suited for high roofs requiring extremely strong, permanent anchor. Republic can also furnish the slotted-type bolt and the conventional bolt with expansion sleeve wherever desired.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

Republic's quality, experience, engineering assistance assure

MAXIMUM DEPENDABILITY OF YOUR BOLTED MINE ROOF

The security of your bolted mine roofs depends, to an enormous extent, on the reliability of your roof bolt supplier. For this reason alone, you owe it to yourself, your men and your production to check Republic on your very next order for mine roof bolts. Here's why:

Republic's Bolt and Chain Division has been a major producer of quality fasteners of all types for over a century. The know-how born of this vast experience is reflected in the design and manufacture of Republic Mine Roof Bolts . . . your assurance of top performance.

Next, as a basic steel producer, Republic exercises complete control over materials from raw ore to finished product. As a result, physical properties are held absolutely uniform in every mine roof bolt in any quantity.

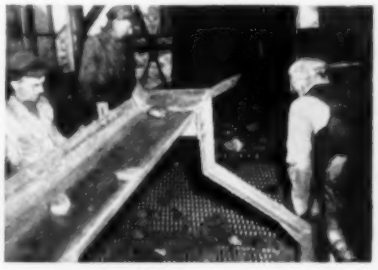
Third, only Republic is able to supply each of the four major classifications of roof bolt assemblies. These include the slotted mine roof bolt; the conventional bolt and expansion sleeve shell; the square head bolt with wedge nut and rigid expansion shell; and the forged wedge head bolt with rigid expansion shell. Each of these types has its proper application depending on roof rock strata, overhead clearance and other factors.

Finally, you can secure expert advice on your mine roof bolting problems through your Republic representative. He can call in a Bolt and Chain Division specialist to run tests in your mine, and to recommend the proper bolt and method of placement to meet your needs.

Get all of these advantages when you enter your next order for mine roof bolts. Contact your local Republic representative. Or mail the coupon for Booklet No. 569.



DEPENDABLE HANDLING of corrosive mine waste water is secured by using Republic Plastic Pipe. Both flexible and rigid types are lightweight . . . easy to handle, cut and join. Made of chemically inert materials, Republic Plastic Pipe is impervious to acids, alkalies, metallic salts and other corrosive wastes, as well as the effects of electrolytic action. Send coupon for details.



MAXIMUM SERVICE of lip screens is obtained by using Republic ENDURO® Stainless Steel. Its high resistance to abrasion and corrosion enables this tough metal to shrug off heavy-duty pounding . . . stay in service longer. Republic, world's largest producer of alloy and stainless steels, specializes in supplying the right analysis for each application. Get the facts from your local representative.



FASTENER RELIABILITY is assured when you specify Republic. The same quality control and precision manufacturing skills that characterize Republic's superior Mine Roof Bolts go into our complete line of over 20,000 standard types and sizes of headed and threaded products. Contact your industrial distributor today. He can fill all of your requirements promptly. For data, mail coupon.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
3124 East 45th Street • Cleveland 27, Ohio

Please send me further information on:
☐ Mine Roof Bolts (Booklet No. 569) ☐ Plastic Pipe
☐ ENDURO Stainless Steel ☐ Bolts and Nuts

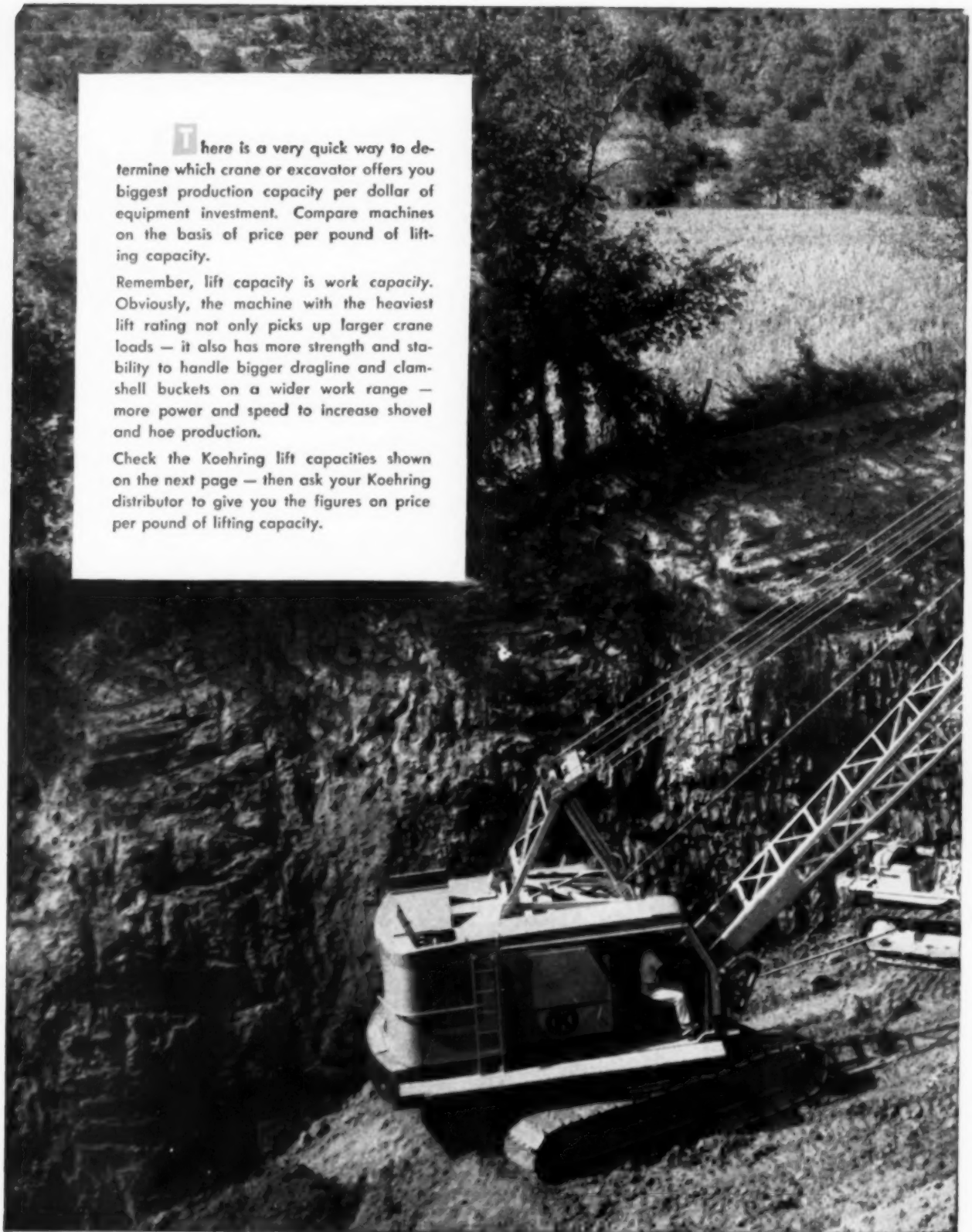
Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

C-1233

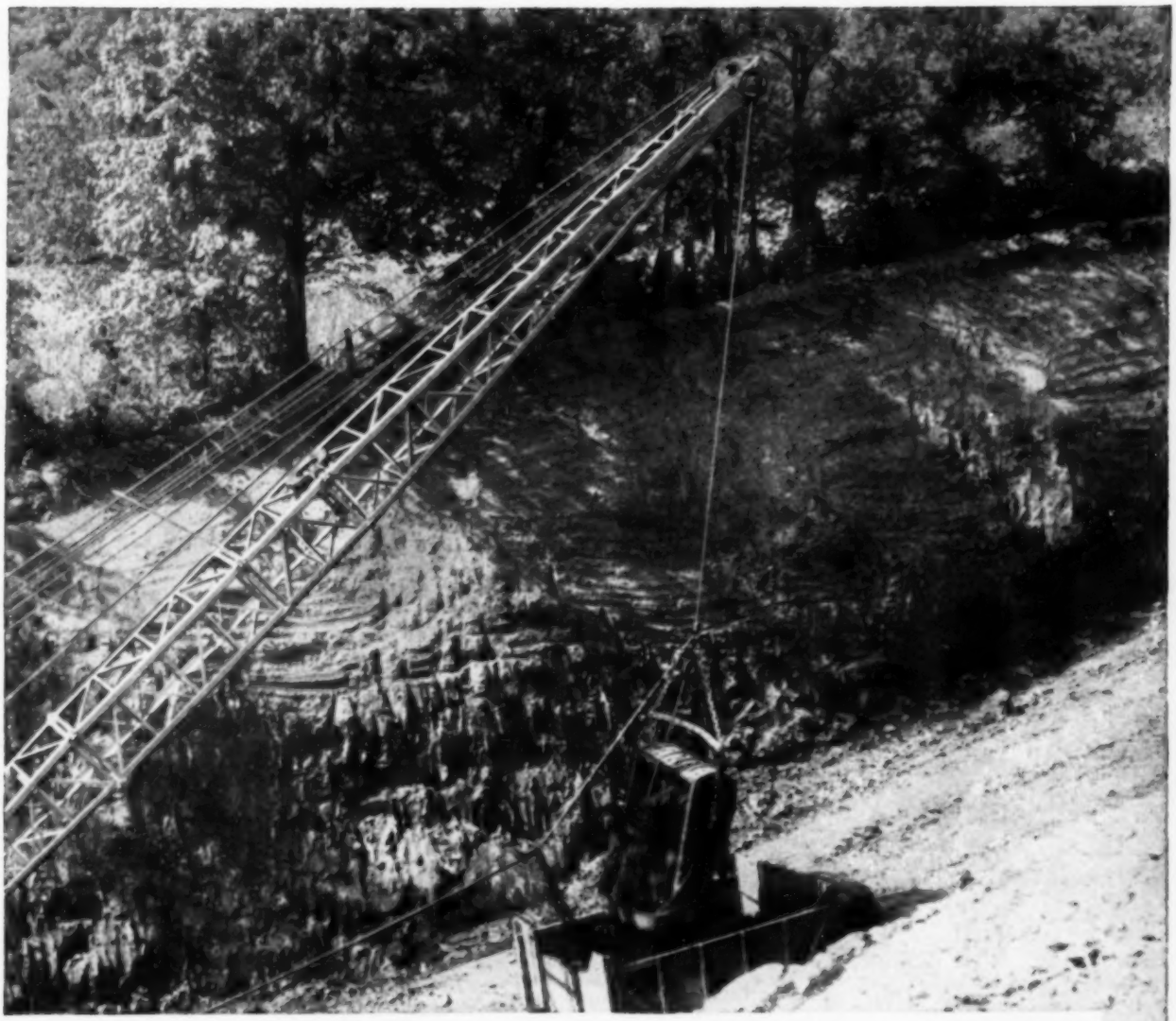


There is a very quick way to determine which crane or excavator offers you biggest production capacity per dollar of equipment investment. Compare machines on the basis of price per pound of lifting capacity.

Remember, lift capacity is *work capacity*. Obviously, the machine with the heaviest lift rating not only picks up larger crane loads — it also has more strength and stability to handle bigger dragline and clamshell buckets on a wider work range — more power and speed to increase shovel and hoe production.

Check the Koehring lift capacities shown on the next page — then ask your Koehring distributor to give you the figures on price per pound of lifting capacity.

KOEHRING COMPANY Milwaukee 16, Wis. *Subsidiaries:* JOHNSON • PARSONS • KWIK-MIX



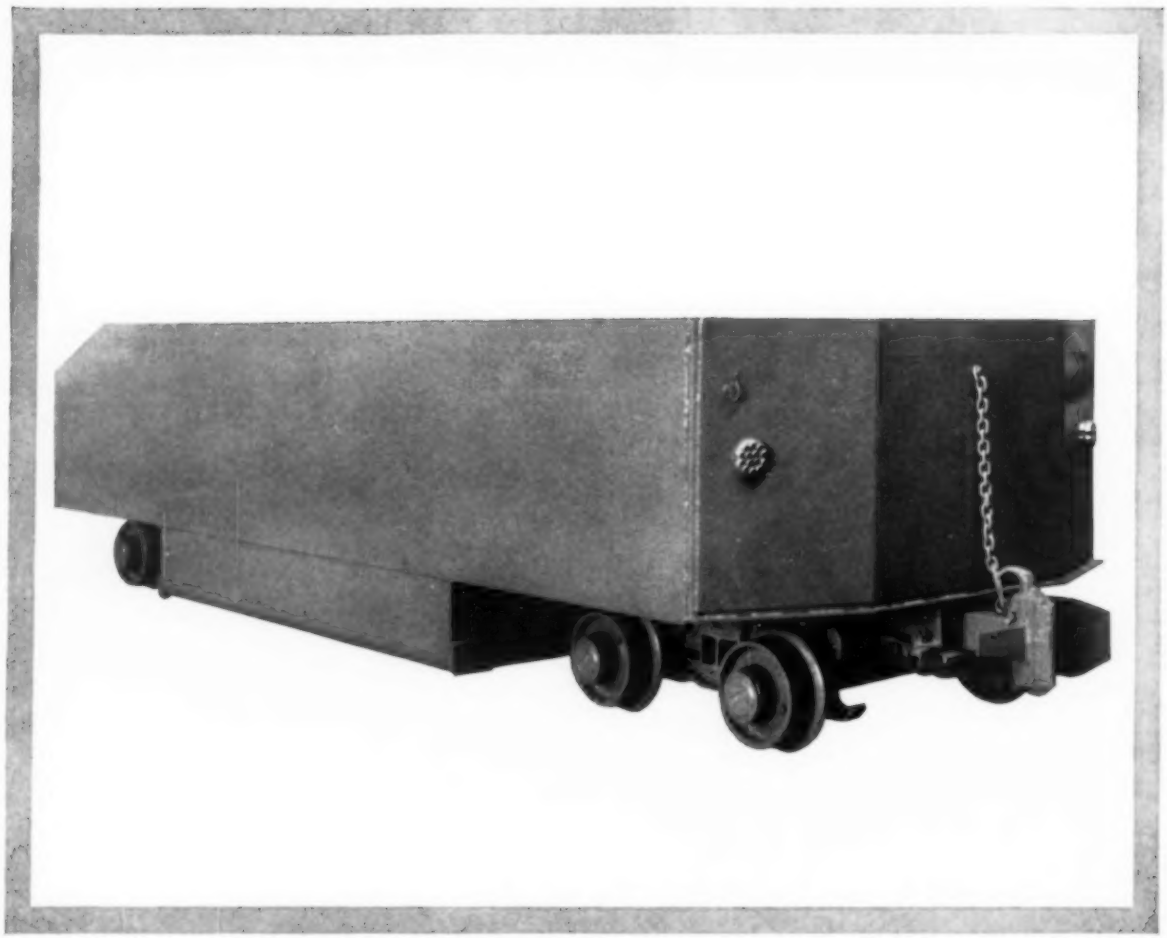
Check price per pound of lifting capacity

KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAPACITY*
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	
304 ON RUBBER	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	

Figures available on request—ask your Koehring distributor for them.

KOEHRING HEAVY DUTY

K-220



What a beating it will take!

The life of a mine car is one endless round of hard knocks. But here's a car that will keep coming back for more — a car that will soak up all you can offer. It's built to laugh at the wallops.

A product of Bethlehem's shops, this husky workhorse accommodates 9 to 10 tons. Its all-welded body rolls on forged-steel wheels. Included in the running gear are cast-steel trucks and roller bearings. Moreover, the car is equipped with automatic couplers and spring draft gear. It is a type in which every component has been designed for high-speed service as well as durability.

Maybe your own requirements run to other designs. But no matter what you need, Bethlehem is fully geared to build it for you. We can produce the car you want . . . end dump, rotary dump, welded or riveted body, high or low sides. And of course you have your choice of four-wheel or eight-wheel designs.

When planning new cars, always feel free to make use of our consultation service. Our engineers will gladly give you their fullest co-operation. Call or write us, won't you?

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

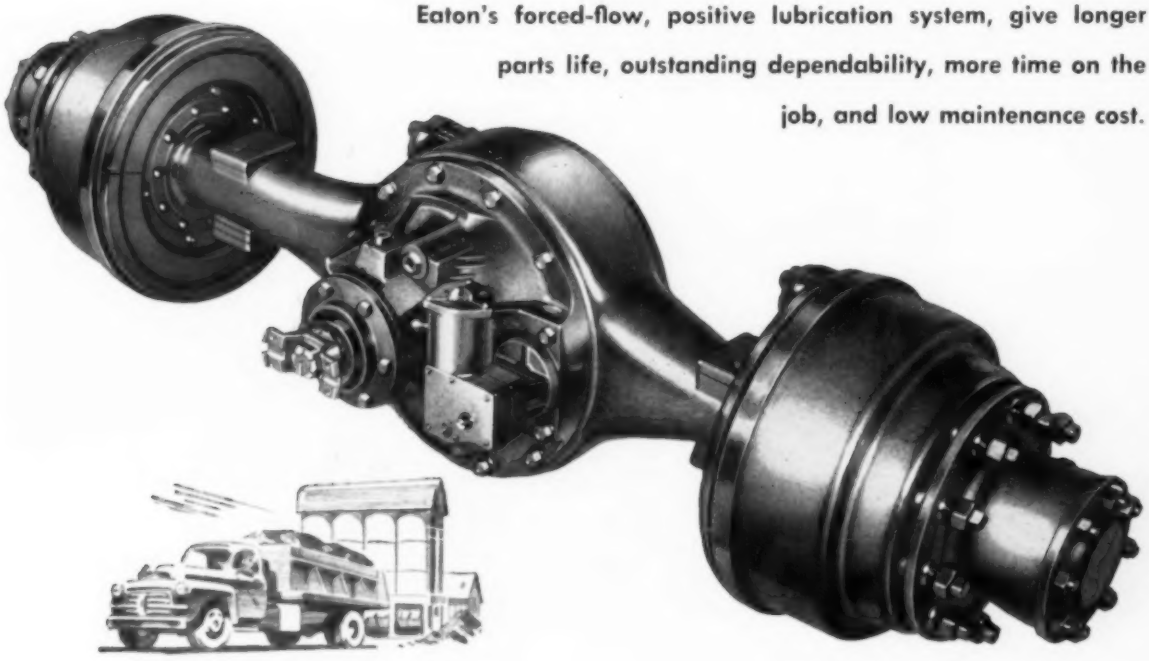
BETHLEHEM STEEL



EATON 2-SPEED AXLES

Keep Trucks on the Job!

The extra stamina built into the Eaton 2-Speed Axle prevents harmful distortion or misalignment under excessive loads. Practical, down-to-earth design makes maintenance quick, easy, and economical. Eaton's exclusive planetary gearing distributes pressure and wear over four husky planetary gears. These extra-quality construction features, plus Eaton's forced-flow, positive lubrication system, give longer parts life, outstanding dependability, more time on the job, and low maintenance cost.



More than Two Million
Eaton Axles in Trucks Today!

For complete information,
see your truck dealer.

EATON AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

FROM THE TOP OF THE TIPPLE . . .



TO THE BOTTOM OF THE MINE



GOYNE

SOLVES YOUR PUMPING PROBLEMS

Goyne Process Pumps were designed for coal and ore preparation plants and sludge disposal service. These pumps have been working for years in many of the country's leading washers, using sand and magnetite as separating mediums. Sludge disposal installations are numerous also.

All Goyne Process Pumps feature suction pressure on the packing box. Special seals are available that admit an absolute minimum of water to the system. Seals are simple and effective and may be added to existing Goyne pump installations.

Accessibility, ease of inspection and repair, and wear adjustment, are second to none with Goyne pumps.

Mine Drainage Pumps have advanced rapidly in design. Illustrated is a 1000 hp. three stage pump installed in the same pump room with two slow speed eight stage pumps. The judicious use of modern alloys, in conjunction with modern design, has made these advancements possible.

We furnish pumps, check valves, strainers, and a complete line of automatic pump control systems, to enable today's mine manager to cut costs.

Bulletins are available upon request.

GOYNE PUMP CO.

ASHLAND • PENNA.



YOUR WICKWIRE ROPE DISTRIBUTOR SUPPLIES THE ANSWERS TO WIRE ROPE PROBLEMS

One of the best ways to find out "what goes" is to be right on the spot. That's why a Wickwire distributor is a wire rope expert—he practically lives with the industries he supplies with wire rope. He knows his customers' specialized problems from first-hand experience, and is able to give competent practical advice on the best construction—6x19, 6x37, 8x19, etc.—for them to use. And he delivers the type, size and length of wire rope they need directly from his warehouse stocks. They save time . . . storage space . . . paper work.

Your Wickwire Rope distributor is a good man to know. He's quality people handling quality products. Buy your wire rope and wire rope slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3153

TWO NEW POWERFUL HUBER-WARCO MOTOR GRADERS

7D 140 H. P.
28,500 lbs.
6D 100 H. P.
25,000 lbs.

Torque Converter and Power-Shift Transmission



Designed to Give the Power and Weight You Want in a Motor Grader

- Powered by GM 3-71 and GM 4-71 diesel engines.
- Tail Shaft Governor—automatically adjusts RPM to meet load conditions.
- Foot Clutch has been eliminated.
- Perfect balance of power and weight.
- Power Sliding Moldboard is standard equipment.
- Hydraulically Cab-Controlled Blade Movement—90° either side.
- Four Wheel Brakes—standard on 7D.

For a demonstration — see your nearest Huber-Warco Distributor

HUBER W WARCO

HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

Road Machinery

CABLE ADDRESS: HUBARCO

ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

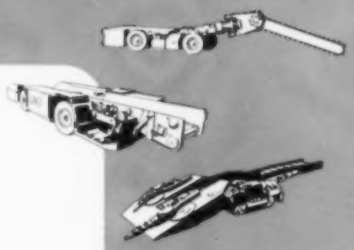
DISTRIBUTION

Conveniently located warehouses are well stocked with quality product lines, including genuine Joy replacement parts and equipment, Wheat Lamps, Kennametal bits and augers, mine supplies, Koehler flame safety lamps, Hayden belt fasteners, conveyer beltings, Bullard hats, modern first aid materials, Riken gas detectors.

EQUIPMENT REBUILDING

The repair or rebuilding of mining equipment to customers' specifications is a major National Mine Service Company activity. Work is performed to high standards of quality—dependably, and on schedule! Large repair and rebuilding shops are maintained at Ashland, Ky. and Logan, W. Va.

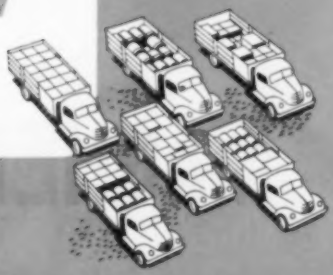




National Mine Service Company







EQUIPMENT RESALE

When you need standard or supplementary mine equipment in a hurry, check National Mine's equipment resale service! Let us save you time and money in providing the equipment you need, in the condition you want—repaired, rebuilt, or "as is". Write for our bi-monthly Stock Reports.

DELIVERY

We bring National Mine Service to your door with regularly scheduled fleets of pick-up and delivery trucks. Special emergency delivery service is also available—where, when and as conditions require it. We invite you to know us better: call in a National Mine representative for helpful discussion and cooperation—write for our "At Your Service" brochure.

IN EVERY MAJOR COAL MINING AREA

Make NATIONAL MINE your headquarters for mine supplies, parts, rebuilding, equipment resale—the host of items and services you need and use. You'll find our service consistently prompt and helpful with understanding based on long experience in meeting mining needs. Let us become a working part of your operating picture, and provide the benefits of National Mine promptness, resourcefulness and integrity in covering your year-round requirements.

National Mine Service Company

HAS THE FACILITIES
—DELIVERS THE GOODS

564 ALCOA BUILDING, PITTSBURGH 19, PA.

7 PLANTS TO SERVE YOU ALL-STATE DIVISION, Logan, W. Va. • ASHLAND DIVISION, Ashland, Ky.
KY.-VA. DIVISION, Jenkins, Ky. • WHITEMAN DIVISION, Indiana, Pa. • ANTHRACITE DIVISION, Forty Fort, Pa.
BEMECO DIVISION, Beckley, W. Va. • WESTERN KY. DIVISION, Madisonville, Ky.

Why is P&H *of the*

MAGNETORQUE* and ELECTRONIC the only modern

These revolutionary advances in design and performance of electric shovels are just two of the reasons why operators and owners are pointing to P & H for their outstanding achievement in electric shovels . . . why P & H now is at the head of the Big Three . . . why P & H can promise you the only modern electric shovel.

Just think! Power transmission *without friction's* in massive electric shovels. Boosts efficiency. Cuts maintenance and operating costs. *This is Magnetorque.* Exclusive with P & H.

Just think! Complete control of dig, hoist, swing and propel of these giants with simple stepless control. 12% faster cycles; 16% savings in operating time. *This is Electronic Control.* Exclusive with P & H.

For complete information, call your P & H representative. Electric Shovel Division, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

For Modern Engineering, Look to

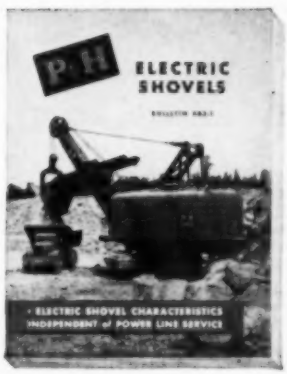
HARNISCHFEGER

P&H

ELECTRIC SHOVEL DIVISION

at the head Big Three?

CONTROLS give operators electric shovels

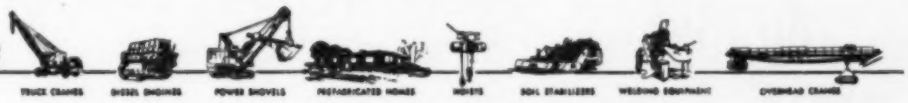


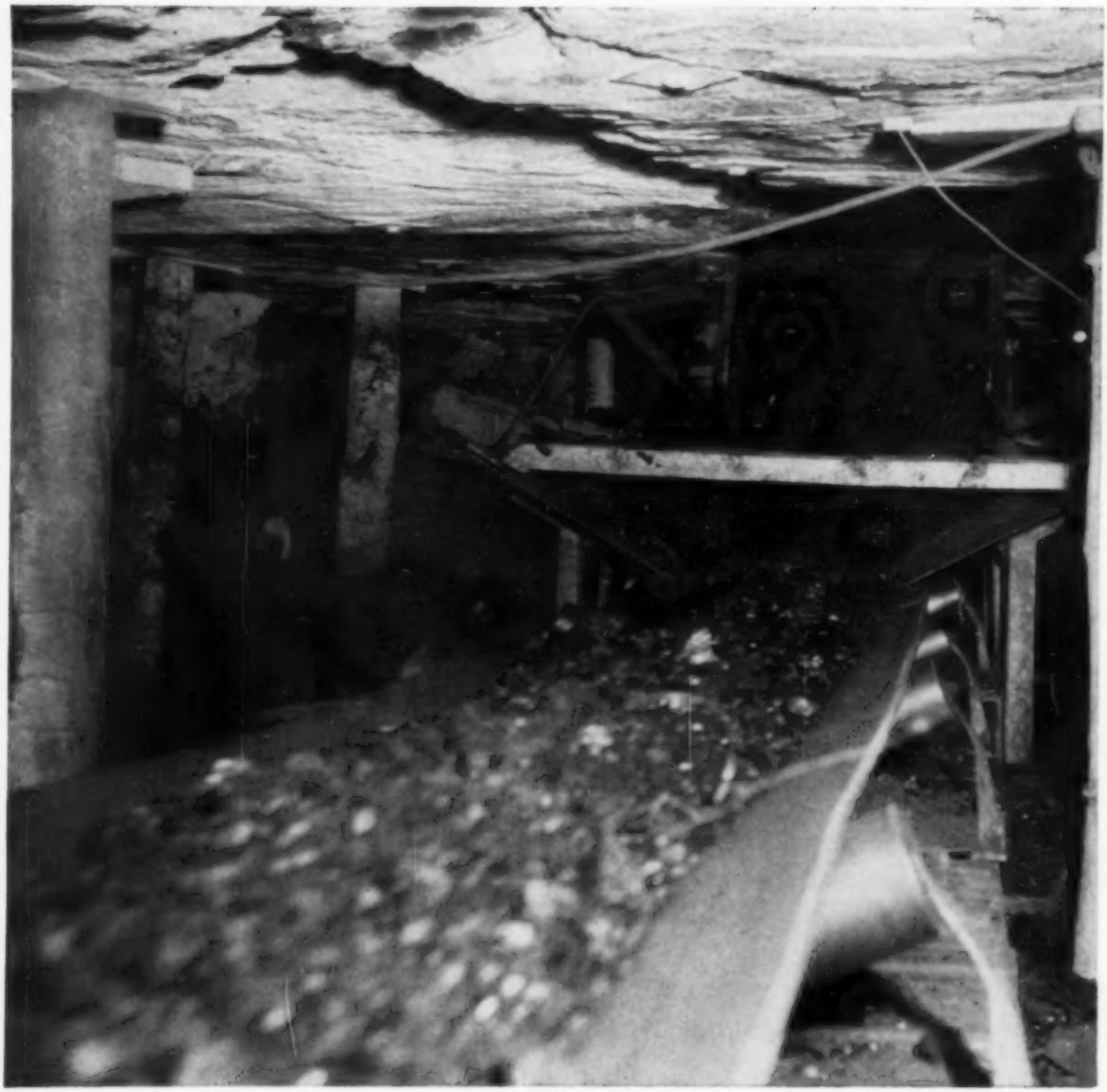
For a clearly illustrated description of Magnetorque* and how it sets a new standard for electric shovel design and operation, write for Bulletin X-156. Other booklets available on electric shovel models from 3 to 10 cu. yd. capacity. A copy of these publications will be sent those who request it on their company letterhead.

*T. M. of Harnischfeger Corp. for Electro Magnetic Type Coupling

CORPORATION *Milwaukee 46, Wisconsin*

the P&H *Line*





NEOPRENE BELTS CUT OPERATING COSTS because only neoprene conveyor covers offer the *balanced* resistance to chipping, cutting, abrasion, heat, weathering, grease and oil needed for long, trouble-free performance. With neoprene, you get low operating and maintenance cost performance *plus* an important extra—mine safety, since neoprene does not propagate flame. That's why it pays to *specify neoprene*—the same tough, safe material used for jacketing *all* mine-trailing cable.

NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

REG. U. S. PAT. OFF.

Better Things for Better Living . . . through Chemistry

FREE! THE NEOPRENE NOTEBOOK

Every issue contains new illustrated case histories, interesting articles, new ways to save with neoprene. Mail this coupon today to E. I. du Pont de Nemours & Co. (Inc.), Elastomers Division **CO-2**, Wilmington 98, Delaware.

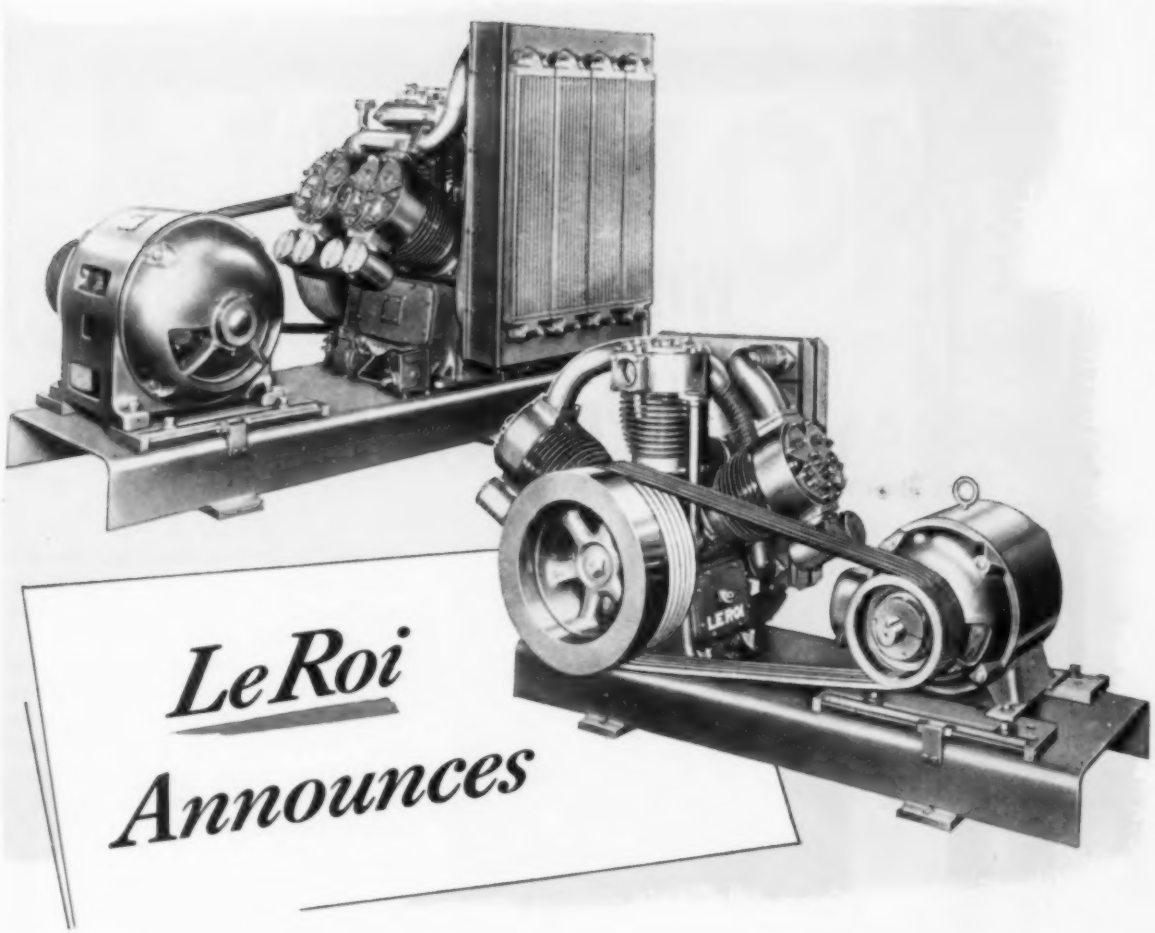
*Name*_____ *Position*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____





Three New Stationary Compressors

Two-stage air-cooled units in 50, 75, and 100 hp. sizes having 200, 330, and 440 cfm capacities at 125 lbs. pressure

Now, Westinghouse Air Brake Co., through its Le Roi Division, adds three new compressors to its stationary line, giving you a size range from ½ to 100 hp. Built to give you years of service, these new compressors are designed to provide you with many important benefits — benefits that mean low-cost air for your plant, mine, quarry, ship, or construction job.

Low-cost operation — Good mechanical and compression efficiency resulting from 2-stage compression and intercooling keeps power costs to a minimum. Moreover, since these new Le Roi's are air-cooled, cooling-water cost is eliminated and attention on the part of the operator is greatly reduced.

Low-cost installation — Compact size reduces headroom and floor space requirements. Again, air cooling eliminates the need for water and water piping so that you can install these units practically anywhere with no fear of freezing. Minimum vibration and light weight lets you bolt them to a substantial floor and save on foundation costs.

Low-cost maintenance — All valves are interchangeable, both intake and discharge. Shrouded-type intercooler and large air passages promote longer valve life. No anti-freeze is required and there are no cylinder jackets or intercooler water passages to clog or scale. Forced-feed lubrication supplies oil under pressure to all moving parts and a sight-level oil gauge keeps the operator posted on the oil supply. The crankshaft is suspended on taper roller bearings that seldom need adjustment, and all parts are easily accessible.

Dual control is standard equipment and permits either constant-speed or automatic start-and-stop regulation. Here's a practical answer to low-cost air supply. Write for our latest literature.

55-199

LE ROI Division of Westinghouse Air Brake Co.

MILWAUKEE 1, WISCONSIN

Distributors in all principal cities



Headed Bolt with Expansion Shell Helps Promote Mine Safety



Your mine becomes a safer place in which to work, with severe roof falls unlikely, when you adopt roof-bolting, using Bethlehem's square-head roof bolt. This method of roof support anchors overlying rock, keeping it firmly in place. Roof-bolting, installed quickly and at moderate cost, has other advantages, too. Ventilation is improved, due to the absence of old-fashioned, bulky supports. There's less need for storage space, both above and below ground. And production is increased, because there's more clear space in which to operate mechanized equipment.

Made in Three Types

The Bethlehem square-head roof bolt is made in three types: (1) ¾-in. diam carbon steel, with minimum breaking load of 20,000 lb; (2) ⅝-in. diam high-strength, with minimum breaking load of 20,000 lb; and (3) ⅞-in. diam high-strength, with minimum breaking load of 40,000 lb.

All three types are used in conjunction with a leaf-type malleable-iron shell, which expands when tightened, locking the assembly in the hole. A square roof-plate provides added support. A hardened washer, furnished with the assembly, reduces friction between the bolt head and the roof-plate.

The best way to get started on a roof-bolting program is to talk things over with a Bethlehem representative. He'll be pleased to call at your convenience. Just get in touch with our nearest sales office.

Slotted Roof Bolts



In addition to the headed bolt, Bethlehem makes a 1-in. diam slotted roof bolt, for use where maximum strength is desired. The bolt is also suitable for pillar bolting. It is furnished with a 6-in. forged slot, and comes with a steel wedge which spreads the slotted portion when the bolt is driven. Bolt has truncated-cone point to prevent thread damage. It is normally furnished with American Standard regular square nut.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

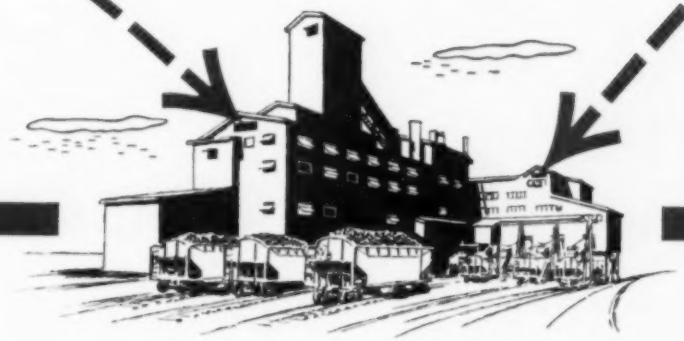
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

FAIRMONT

The Mark of Service !



● This FAIRMONT symbol of service on the side of a modern coal preparation plant shows that here the job of cleaning and preparing coal is being done better.

● It means that the customers of this FAIRMONT-Built plant are enjoying a more uniform product with its resulting increased efficiency and reduced costs.

● Preparation Plants displaying the FAIRMONT Service Mark, are the advanced product of 60 years of successful engineering and erection by Fairmont Machinery Company . . . a Company which provides a wide choice of quality equipment, as well as the qualified talent necessary to carry through a job from the drawing board to the finished and operating plant.

When you plan to modernize an old or build a new coal preparation plant include the FAIRMONT Mark of Service in your planning.

FAIRMONT
MACHINERY COMPANY
FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.



Full traction while turning. The Turbo-Dozer has four-wheel drive with rear-wheel steer: full traction is maintained on all four wheels even while dozing on turns during fast in-and-out passes—no lost loads or tire scuffing. With power-shift transmission, the Turbo-Dozer can be shifted instantly, gets in and out fast. If the front wheels have a tendency to rise, the operator can tilt the bowl back and build up the load weight on the bowl and on the front wheels. No need to raise the bowl or disturb the grade.

Exclusive power-tilting bowl. The operator is cleaning up close to the 38-yd. shovel. He can tilt the bowl back and forth while travelling—a 33 degree arc between "dig" and "float" positions. By tilting the bowl forward to "float", the operator makes sure that he rides the seam without cutting into it. Note the hubs of the Clark axles: final planetary reduction takes 70% of the torque load off the axle shafts.

Swinging drawbar. The Turbo-Dozer's swinging drawbar is mounted to the frame below the centerline of the wheels. This assures maximum traction and stability for heavy towing assignments. It's a fast and versatile dozer for relocating electric cables, towing work-houses, pulling other mining equipment up steep grades, general maintenance.





Report on the MICHIGAN TURBO-DOZER:

New dozer features 27 mph speed, power-tilting bowl, rear-wheel steer

The new 2¾ yd. capacity Michigan Turbo Dozer combines rubber-tired speed and mobility with outstanding traction and power. Its turbocharged diesel engine develops 165 hp, with maximum rimpull of 28,000 lbs. At 27 mph, it runs rings around any dozer on the market! The Turbo-Dozer can cover assignments from one end of the mine to the other. It runs on rubber from one job to another—shovel clean-up, dump, road maintenance jobs, cable relocation, miscellaneous towing.

Exclusive power-tilting bowl. A powerful double-acting hydraulic cylinder tilts the bowl back and forth through a 33 degree arc. With your right hand on the bowl-control lever, you can change the bowl angle from "dig" to "float" as you travel—clean up the surface of the seam without cutting into it. You can hook the cutting edge under tough rock or obstructions—work it up and down to root them out. Two 6-inch lift cylinders give you tremendous lifting power and down pressure, from 24¼ inches below ground level to 43¾ inches above.

High flotation tires, oscillating axle. Big 18.00-25 low pressure tires (nearly 7-foot tread) give the Turbo-Dozer excellent ground contact in dry, wet or sandy footing. You can cross railroad tracks or travel along the ties or road bed. On uneven terrain, the steering-drive axle oscillates to keep both rear wheels in firm contact with the ground. With 14½ inches of ground clearance underneath, it's practically impossible to get "hung up".

Full traction while turning. The Turbo-Dozer gives you full tractive effort even in a turn. *All four wheels are always driving,* except when you declutch the rear axle for highway travel. Rear-wheel steering eliminates unnecessary tire wear —you don't brake or drag your inside wheels on a turn.

In maintenance of mine roads, you can doze a load down a steep grade, turn it into a tight spot—and still have full power to pull yourself out with the wheels cramped the way you went in. If one wheel begins to slip, a locking differential automatically applies power to the wheel with the firmest footing.

Power-shifting, 300% torque multiplication. Clark's exclusive power-shift transmission eliminates the conventional engine clutch and foot pedal—the most notorious cause of excessive maintenance and operator fatigue. With two fingertip levers on the steering column, the operator can instantly shift between High-Low and Forward-Reverse —even when moving in either direction.

The 3-to-1 Clark torque converter gives you a steady power flow, regardless of speed. As the load gets heavier, the torque output automatically increases up to 300% at stall speed—gives you the extra torque to plow through the toughest spots. You can't stall the engine, and there's no clutch to slip.

Top speed 27 mph. The new Turbo-Dozer is 50% faster than any other rubber-tired dozer, four times faster than the average crawler. It dozes faster and travels faster, which means it will give you faster cycles going and coming. You can economically send the Turbo-Dozer on its own power to handle jobs many miles away, and you can cover more ground on any given job. But speed isn't the whole story. Once the Turbo-Dozer arrives at the site and starts to work, *it's got the muscle to do the job!*

See the Turbo-Dozer movie. You can see the new Turbo-Dozer working typical jobs in a 20-minute color movie—see how it will give you faster cycles, more yardage or tonnage in every shift. Ask your local Michigan distributor to arrange a showing at your convenience—no obligation, of course. Or write direct: we'll send you a 20-page photo booklet which gives complete details on the new Michigan Turbo-Dozer.



MICHIGAN is a trade-mark of Clark Equipment Co.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2473 Pipestone Road
Benton Harbor 35, Michigan

Completely power-controlled. Operators say that the new Turbo-Dozer is the "easiest" machine they ever operated. The power-shift transmission eliminates the conventional clutch, does all the work of shifting. Here the operator dozes a load against the bank; now he'll power-shift to reverse and pull away fast. Four-wheel power brakes and power steering are also standard equipment.

Loss of magnetite reduced **from 2.2 pounds** per ton of coal processed **to less than ½ pound**

8 JEFFREY MAGNETIC SEPARATORS serve this Jones & Laughlin coal preparation plant



Magnetite, scraped from the magnetic separator drum, is fed back into the system to maintain 1.55 specific gravity.

Wash water passes under these eight Jeffrey magnetic separators to recover the magnetite removed from slate and coal leaving heavy-media separator drums.

Coal floats and slate sinks in water that has been given a specific gravity of 1.55 by the addition of magnetite. This is the principle of heavy-media separation, by which coal is cleaned and graded, and other minerals classified, rapidly and efficiently.

This Jones & Laughlin coal preparation plant was losing 2.2 pounds of magnetite for every ton of material processed, which was serious. 2400 tons per hour are processed here. They revamped the system to include Jeffrey magnetic separators and now they lose less than a half-pound per ton.

After cleaning, the coal again passes through a second heavy-media operation, wherein the heavier steam coal is separated from the lighter metallurgical coal. Here, again, Jeffrey magnetic separators have a part in recovering the magnetite.

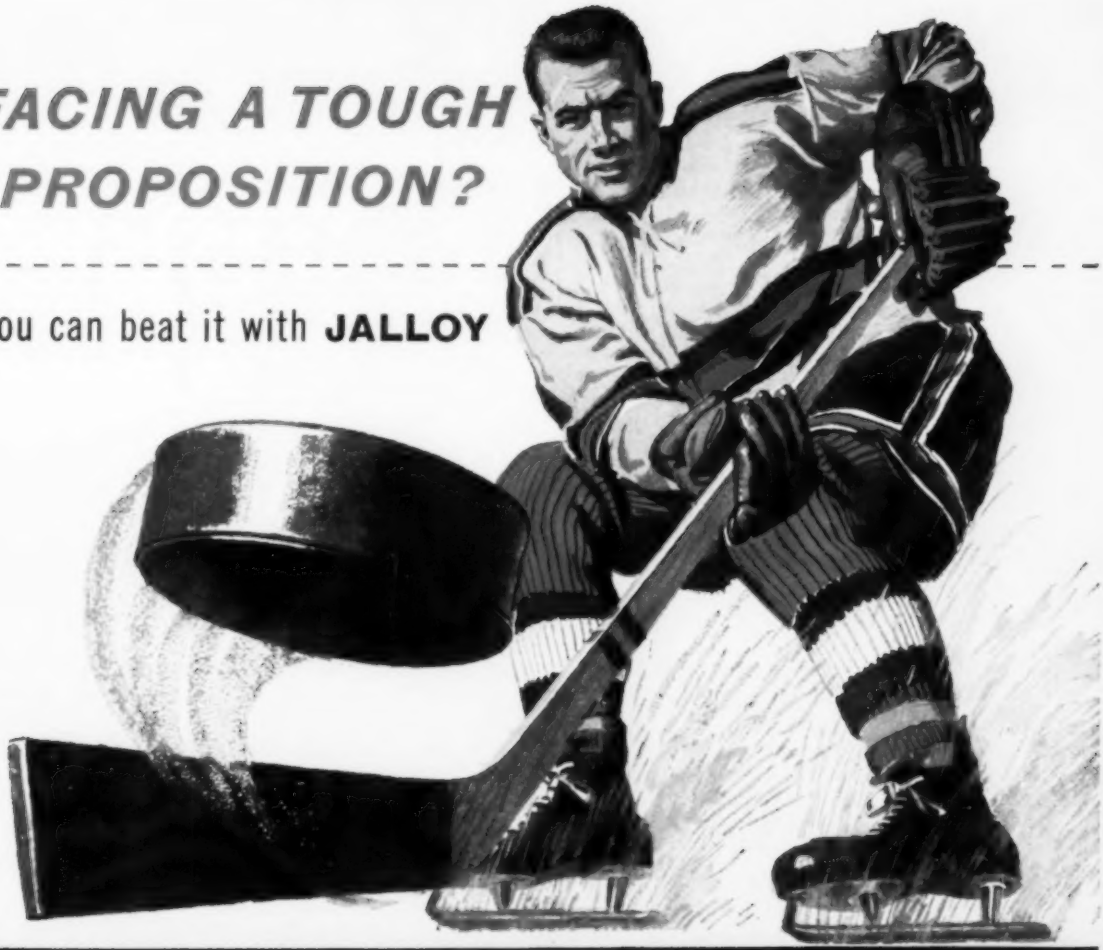
Jeffrey engineers will help you apply magnetic separators to solve wet concentration and magnetic recovery problems. Bulletin 846 describes this equipment. The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

FACING A TOUGH PROPOSITION?

you can beat it with **JALLOY**



J&L JALLOY HEAT-TREATED PLATE BEATS WEAR DUE TO ABRASION



J&L Jalloy Heat-Treated Plate is the general purpose steel that is heat treated to provide longer wear on applications where impact and abrasive conditions are severe.

In comparison with other abrasion-resistant steels as well as mild steels, it gives optimum results when heat treated to a Brinell hardness of 340 and up. Jalloy permits savings in steel costs, maintenance, and repair. Furthermore, it is easily welded. Jalloy is available in three grades to meet various service requirements.

J&L STEEL

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*



Complete data concerning CHEMICAL COMPOSITION . . . HEAT TREATMENT . . . WELDABILITY . . . PHYSICAL PROPERTIES . . . will be mailed to you promptly. Write today.

Jones & Laughlin Steel Corporation
3 Gateway Center, Dept. 411, Pittsburgh 30, Pa.

☐ Please mail complete data concerning Jalloy.
☐ Please have your representative call.

Name _____ Title _____

Company _____

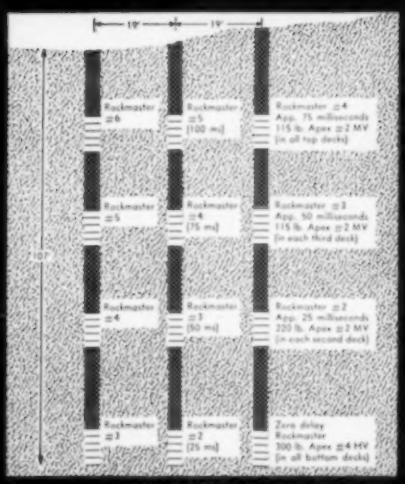
Address _____

Delayed "triple deck" blast cuts air snap, vibration...*and complaints!*



MISSION: Move an 18-ft. burden off a 107-ft. quarry face. Get good breakage—but no complaints.

METHOD: "Triple Deck" each hole and shoot each deck separately with ROCKMASTER® millisecond delays. Blast initiated at bottom of each charge for maximum confinement. (Note movement, at ½ second, lower right.)



Blast uses six ROCKMASTER delay periods in three 107-ft. holes. 750 lbs. of Apex® quarry and stripping explosives loaded in separate decks in each hole.



At full second, entire burden is in motion. Toe leading . . . excellent control. Sound muffled . . . little vibration.



Low final muck pile . . . well spread. Excellent breakage . . . little work for the drop ball.

WHEN you're blasting in the middle of a heavily populated residential area, you *know* the neighbors are listening. Good public relations are a must—but so are good breakage and control!

Union Building and Construction Co., Clifton, N. J. solved this dilemma with ROCKMASTER®. Working hand-in-hand with their Atlas representative, they developed this unique method of "deck initiation." It takes *extra* advantage of all the benefits of delayed-action ROCKMASTER electric blasting.

Ask *your* Atlas representative about ROCKMASTER—the modern blasting method that gives you quiet efficiency, saves explosives, and adds a "good neighbor policy" for a bonus.



GET "BETTER BLASTING"

If you are not already getting this informative periodical, let us put your name on our mailing list today.

(P. S.—Tell us who else in your organization should get "Better Blasting", too.)

ATLAS

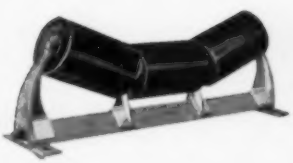
ATLAS EXPLOSIVES

"Everything for Blasting"

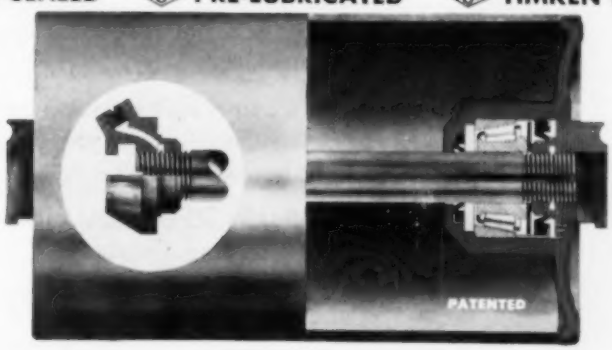
ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE

Offices in Principal Cities

You Need... CONTINENTAL'S UST Idlers



CGC UNIT-SEALED CGC PRE-LUBRICATED CGC TIMKEN BEARINGS



Saves Grease!
Saves Labor!
Saves Belts!
Long Life

Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klozures, are the answer to the operator's prayer.

The Unit Bearing Assemblies—"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellant grease of a stable consistency with a wide temperature range for long life.

Most important—this construction permits operating the Continental "UST" Idler for extended periods of time without relubrication for 1-2-3 years or longer depending upon the severity or character of conditions.

For detailed information on these idlers write for Bulletin CA-116

– THE ULTIMATE IN MINIMUM MAINTENANCE

CG—5210



INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS



THE STRONGEST WIRE MAKES THE STRONGEST ROPE... THAT'S WHY ONLY 1105 IS USED IN

ROEBLING

Royal Blue

WIRE 1105 ROPE

1105 WIRE is the strongest and toughest rope wire that has ever been developed.

Royal Blue is a new all-steel wire rope. It's made of 1105 wire—stands up in service—gives you more for your money because it has more to give.

Ask us for the full facts about Royal Blue Wire Rope, or contact your Roebling distributor.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6816 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST. AVE. S. • TULSA, 321 N. CHEYENNE ST.• EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

DRILLING COSTS GO DOWN

When Bucyrus-Erie Rotaries Move In

These are actual reports supplied by strip mine operators* who use Bucyrus-Erie rotary blast hole drills to prepare overburden. On job after job, company records basically say this: "Since introduction of Bucyrus-Erie rotaries, our drilling footage per shift has risen spectacularly while costs have dropped sharply. Maintenance is extremely low; bit life is excellent considering the rate of progress."

Consider the results obtained by these owners in light of your own drilling requirements. Then let us give you the complete story on Bucyrus-Erie rotary blast hole drills. Model 50-R, with electric power, drills 9⅞ to 12¼-in. holes. Model 40-R, with diesel-electric or full-electric power, drills 6¾ to 9-in. holes.

* Names will be supplied on request.

BUCYRUS-ERIE CO.
South Milwaukee, Wis.

In an Indiana Coal Pit a Bucyrus-Erie 50-R rotary drilled a total of 1,325 feet in a single 6¾ hour shift through overburden consisting of medium-hard sandstone with overlay of hard shale. This footage was attained with 10⅞-in. holes averaging 40 feet in depth. Thirty-three holes were drilled in one day's work; average footage drilled was 196 feet per hour.

In a Pennsylvania Anthracite Strip Mine the material was conglomerate, granite and sandstone, very hard and abrasive, and badly broken up and fissured. A Bucyrus-Erie 50-R drilled 9⅞-in. hole at the rate of 24 feet per hour. During 256 hours working time, the drill put down 6,125 feet.

Another Pennsylvania Hard Coal Stripping Operation reported 27,750 feet of 12¼-in. hole drilled during a total of 1,458 hours working time. Material was extremely difficult — hard and medium sandstone, shale, conglomerate and slate. Footage per hour was 19 feet for holes averaging 70 feet in depth. Average bit life was 1,762 feet.

At an Illinois Mine progress of 529 feet per shift, drilling 10⅝-in. holes, was reported with the 50-R. Cost per foot was cut 37% compared to previous performance of another make of rotary drill. Owner's comment: "Savings made by the 50-R will enable us to write off its cost in less than one year."

21B55C

75 Years of Service

1880 BUCYRUS ERIE 1955

To Men Who Shape The Earth



Drilling 12¼-in. dia. holes, this Bucyrus-Erie 50-R prepares overburden at Hazelton, Pa.

THE SQUARE KNOT shown is used *only* to lengthen a *trunk* line of Plain or Reinforced Primacord — above ground. It must be drawn up *tight*.



He's tying in another acre of good digging

His holes are laid out in a pattern to obtain the best break-up with respect to the open face, or the most logical direction of the movement of the bank. They're loaded and primed with Primacord, the insensitive detonating fuse. A trunk line of Primacord connects all holes in a planned firing sequence which will promote better fragmentation.

So — he can shoot a few holes or a few acres with one detonator. And he can fire when ready, because Primacord is insensitive to ordinary shock, friction, sparks or stray electrical currents — and even a direct hit by lightning failed to detonate it. Available in Plain, Reinforced, Plastic Reinforced and Plastic Wire Countered.

Ask your Explosives Supplier, or write to

THE ENSIGN-BICKFORD COMPANY

Simsbury, Connecticut

Primacord • *Quarrycord* • *Ignitacord®* • *Safety Fuse*
Blasting Accessories • *Established* 1836

PRIMACORD

The Proved and Approved DETONATING FUSE

P-4

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

FEBRUARY, 1956

IVAN A. GIVEN, EDITOR

Coal Resurgent

COAL HISTORIANS probably will point to 1955 as the year in which coal staged its third biggest comeback. First-place honors go to the 1923 recovery from the depression and strike of 1921 and 1922, and second to the 1950 rebound from the strikes and "no-day" schedules of 1949. But earlier recoveries not withstanding, the 1955 comeback was impressive not only in percentage (18.6) but in actual tons—over 70,000,000, or from 392,000,000 (estimated) in 1954 to 465,000,000 in 1955. Anthracite, in contrast, experienced a further decline but could claim with some justification that it apparently was reaching a resistance level. Production dropped only 2,196,000 tons, or 8.1%, from 27,118,000 tons (estimated) in 1954 to 24,922,000 tons in 1955. In comparison, the drop from 1953 to 1954 was 3,831,000 tons, and from 1952 to 1953, 8,734,000 tons.

Better in 1956

What of 1956—and the years to follow? The "if" in the picture is general business and industry, but the majority of the economists and business forecasters agree that it is a minor one. Therefore, continued good times are expected in 1956. On this basis bituminous production should continue up to 500,000,000 tons or better. Anthracite should hold its own fairly well. Beyond 1956, the upward trend in bituminous will accelerate, while anthracite prospects are definitely brighter.

Basic Change

Growing population and a rising standard of living, in turn increasing the demand for energy, are the major factors favoring coal growth in the future. Both, however, would be meaningless without a third—growing acceptance by consumers and the general public that coal is the Nation's best source of low-cost energy. Because of this basic change in climate, and because of the brain sweat and money the industry has poured out to cut cost and heighten quality, coal is secure in the growing fields of electric power, steel and general industry; has excellent prospects of holding and improving its domestic and commercial business, and of getting back into the railroad field; and can reasonably expect to open up new markets in chemicals and synthetic fuels in the future.

Not for the Asking

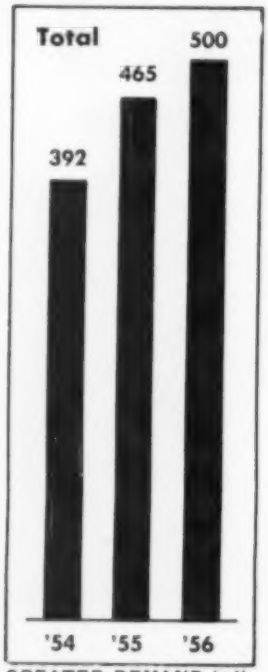
All these things, however, will not be had merely for the asking. Even a cursory check of the coal problems discussed in the review material elsewhere in this issue (including the list on page 77) leads to the definite conclusion that coal still has troubles. But the reversal in public and consumer thinking, and in production, provides a firmer base from which to operate in reaching solutions. Consequently, they should be easier to attain.

New Opportunity

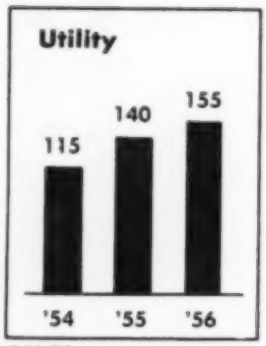
Summing up, there is now better reason than ever for contending that coal has a new opportunity to grow and prosper through proper planning and consistent, effective follow-through. The basic factors in imparting added strength to coal's resurgence? Still utilization research to expand existing markets and devolop new, and still continuation and strengthening of cost-cutting programs in the mine, and of beneficiation advances in the preparation plant, backed up by an improved, more-comprehensive and harder-hitting merchandising and service program.

Coal Resurgent . . .

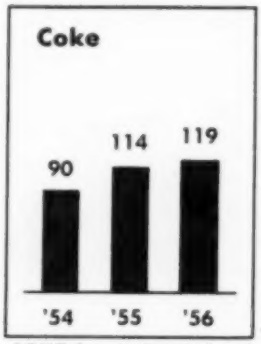
BITUMINOUS



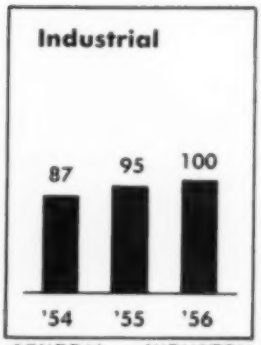
GREATER DEMAND indicates 7.5% higher output in 1956, possibly 13% if second half holds up as strong as first half.



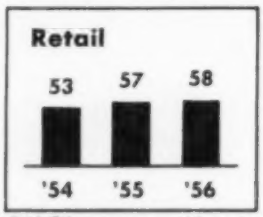
SALES moved ahead 25 million tons or 12% in 1955. The current year should bring an increase of about 15 million tons.



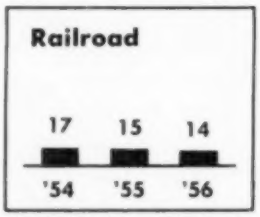
COKE for steel and chemicals took 27% more coal than in 1954. High steel output should boost 1956 coke use by 5 million tons.



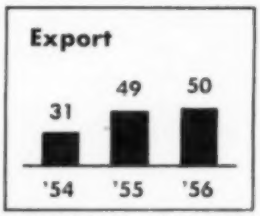
GENERAL INDUSTRY, including cement mills, upped coal use by 10% in 1955. Sales should jump 5 million tons in 1956.



SALES were up 10% in 1955 with slight rise due in years ahead. Sharper rise possible with harder-hitting merchandising.

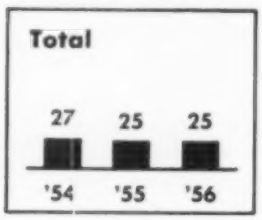


A DROP of 2 million tons occurred in 1955. The first coal-burning gas turbine locomotive due in 1957 may trigger comeback.



SHIPMENTS OVERSEAS in 1955 were double 1954; to Canada about the same. Overseas may hit record in 1957

ANTHRACITE



PRODUCTION fell about 8% in 1955. But year-end liquidation of stocks and a severe winter indicate no further drop in 1956.

Spurred by tonnage and competitive gains of the past year, coal gears up to cash in on the opportunities ahead. Utilities and steel pace the upswing but all markets show promise. Newcomers, aluminum and chemicals, coming up.

1955 Opens New Era Of Expansion

A REJUVENATED COAL INDUSTRY, up from the doldrums of '54, hit its stride in 1955 and began working to new levels of achievement in production, processing, marketing and use in 1956.

Even the most optimistic observers failed to predict that 1955 bituminous output would hit 465 million tons, up 73 million tons and 18.6% over the previous year. The increase was all the more striking when compared to oil and gas output, both of which reached record 1955 highs, but only 8% above 1954.

Although anthracite production was down 8% to about 25 million tons, a much-needed year-end liquidation of stocks, plus the prospect of new markets opening up in steel, gave the industry high hopes for greater prosperity in 1956.

Much of the jump in bituminous output was due to booming national and world prosperity, which sparked expanded coal needs for electric power, steel, chemicals, other industrial markets, and overseas exports. Continuing strong demand for coal in its most important markets indicates at least a 500-million ton production year in 1956—and possibly as much as 525 million tons if the second half

of 1956 holds up as strong as economists predict for the first half.

But there is more to coal's rejuvenation than national prosperity. The industry in 1955 regained competitive strength and new vitality to capture the opportunities ahead. Coal took over a larger share of the utility market and pushed aggressively to recover other industrial markets raided in recent years by residual oil and natural gas. The vast potentials of new markets, particularly chemicals and aluminum, were examined and pursued more closely.

Companies also sought to fortify their sales and competitive positions through cost-cutting campaigns, mergers, diversification of income, and better merchandising methods at both the industrial annd retail levels. Mechanization advanced as the percentage of underground coal loaded mechanically increased from 62.2% in 1954 to 64.5% in 1955. High freight rates remained as the No. 1 headache. But possible cures were on the way as more thought and action was given to new, alternate and substitute methods of transport.

Anthracite Rollcall

1955: Down But Cause For Optimism in '56

COMPARED TO 1954, total production of anthracite dropped about 8% in 1955 to 24,922,000 tons. However, the industry went into 1956 with high hopes for greater prosperity, based on several favorable developments.

Although anthracite output fell off for the calendar year 1955, the Anthracite Institute reported that producers' sales for the 12 mo ending Oct. 31, 1955, amounted to 25,945,000 tons, or 29,000 tons ahead of the comparable 1953-54 period. Increased producers' sales, reflecting a much-needed liquidation of inventory and a stronger demand, pointed to a flattening out of the sales curve, previously headed downward.

Sales of anthracite automatic heating equipment in 1955 were up 38% over 1954. This was due largely to the industry's renewed drive to push use of anthracite for space heating. Sparking the drive, the "Anthracade," a mobile display of modern equipment, took the story of hard coal's advantages to thousands of potential users in the anthracite burning area. The Anthracade will go on the road again in 1956, this time featuring the

(*Continued on page 56*)

Problems and Progress

COMPETITION: Definite Gains

Demand for oil and gas in 1955, each up 8% over the previous year, hit new highs of 3,066 million bbl and 66.5 billion therms, respectively. Coal, however, made definite gains on oil and gas in competitive markets. Most concrete was the increase in its share of the utility market from 66% to 69%. New opportunities for converting oil-consuming industrial plants to coal appeared as petroleum refiners showed a growing preference for shifting residual oil stocks to more profitable markets, such as, asphalt and petroleum coke. The strong opposition to rising natural gas prices, voiced by public officials testifying on the proposed Harris bill, indicated that the natural gas honeymoon was over. In spite of gains, thorny problems still remain. Residual oil imports are down but not yet to the cabinet-recommended level consistent with national defense. Coal's fight to stop raiding of its boiler fuel markets by natural gas will continue. Battles are also in prospect on proposals to transmit natural gas to and from Canada. On the atomic energy front, there is no cause for coal to fear competition from nuclear power during the foreseeable future. At the same time, the industry cannot afford to "rest on its oars."

TRANSPORT: Headache With Possible Cures

Moving coal from mine to market will continue as the industry's No. 1 headache in 1956. On top of making permanent a temporary 12% to 15% general freight surcharge won by the railroads in 1952, the ICC has given rail carriers the green light for another 7% hike, scheduled to become conditionally effective Feb. 26, 1956. Railroads are expediting efforts to cut down on car shortages, although substantial relief is not expected until at least mid-1956. Perhaps not the cure-all but certainly a palliative for transport headaches is the increasing trend toward new, alternate and substitute methods for moving coal. Examples are Pitt Consol's 106-mi pipe line now under construction, heavier river barge traffic, and the announced plans of aluminum companies to locate primary-producing plants near Ohio Valley coal mines.

MANAGEMENT: Organizing For Profit

Management stepped up plans to provide greater mine capacity to meet increasing demand. Significant additions were made during the last half of 1955. Still greater increases in new capacity, however, must be added to normal replacement of exhausted mines, if the industry is to stay 10% ahead of the 600-million ton demand expected by 1960. A number of companies sought to strengthen their competitive and sales positions through mergers and diversification of income. More effective merchandising was high on the agenda.

LABOR FRONT: Aggressive But Still Peaceful

Without fanfare, the Nation's bituminous operators and the UMWA agreed in August on a record $2 pay raise and other benefits. The 1955 wage hike will take care of labor's needs temporarily, probably through 1956, unless the accelerated trend in production should go beyond present expectations. The immediate effect of the pay increase was a jump in coal prices; over the long-range, an intensification of the drive to take labor out of the mine price of coal was seen. This means more mechanization and higher output per man.

LEGISLATION: '56 Critical for Coal

Adjourning last August, Congress left considerable unfinished business of interest to the coal industry for action in the current session. Most controversial item on the docket—up for early action—is the House-approved Harris bill to exempt natural gas producers from direct federal regulation. Other matters include the transportation tax on coal, Social Security benefits and cost, federal and state cooperation in controlling water pollution, proposals to define the Labor Secretary's authority in making industry- or area-wide minimum wage determinations, and the construction of new TVA steam plants. The NCA will continue to fight excessive foreign oil imports, the dumping of natural gas under industrial boilers, high railroad freight rates, and the use of public funds for government-owned or subsidized nuclear power plants.





STEEL AND ELECTRIC POWER: Backbone of the economy's prosperity and mainstays of coal's upsurge.

"Operation Home Improvement" program, sponsored by the U. S. Chamber of Commerce and the entire home-building industry.

Overseas exports for the first 9 mo of 1955 soared to 289,000 tons—219% ahead of the comparable 1954 period. At the same time, 9-mo sales to Canada rose to 1,651,000 tons, or 2% above the previous year.

With steel output climbing to new heights and with the growing shortage of metallurgical coals, the future of anthracite in steel-making showed great promise. Over a major 1955 period, anthracite use in making a coke blend was running at an annual rate of 376,000 tons, nearly 70% greater than the 5-yr annual average for 1950-54. September and October sales, the two latest available months, edged up still higher and hit an annual rate of 416,000 tons.

Impressive though coke blend usage may be, planning and research pointed toward much bigger markets for anthracite use (1) as a direct charge into blast furnaces with coke, (2) as a pelletizer in processing taconite iron ores, and (3) as a sintering fuel to step up blast furnace production. Some observers predict an eventual 5-million ton market, and possibly more, for anthracite use in steel-making.

Further cause for optimism came during the past year as federal and state authorities put greater emphasis on the importance of anthracite to the Nation's total energy resources program. A huge $17 million anthracite drainage project was started. The funds, half appropriated by the federal government and half by the Commonwealth of Pennsylvania, will be used to purchase and install facilities to keep surface and underground water out of mines. Effective drainage means that pumping costs, a major expense in anthracite mining, should be cut sharply. The past year also brought larger funds for anthracite research at the USBM laboratory, Schuylkill Haven, Pa., and the establishment of an anthracite division in the USBM.

Bituminous Markets

UTILITY: Still Rising; Gaining Over Oil, Gas

TO GENERATE THE NATION'S POWER for the most prosperous year in its history, electric utilities established new records in fuel consumption. Based on part-year data, 203 million tons of coal and coal-equivalent were consumed by utilities in 1955, a 22-million ton, or 12%, jump over 1954. Significantly, greater coal burn accounted for 96% of the jump and increased coal's share of the total fossil-fuel power market from 65 to 69%. This evidence suggested that oil and gas reached their competitive peak in the utility market in 1954.

Coal gained in all of its logical utility markets in 1955. The biggest increases over 1954 occurred in the East South Central region, due primarily to TVA needs, and in the East North Central region, where AEC demands were the dominating factor. Oil lost ground in the New England, Middle Atlantic, West North Central, West South Central and Mountain regions, while gains were concentrated in the Pacific region. Gas lost out or remained about the same in all except the New England, Mountain and Pacific regions where substantial gains occurred.

The current year should bring at least a 15-million ton increase in utility coal use, from 140 to 155 million tons. Recent events point toward greater utility consumption of coal and less oil and gas in most regions of the country. In 1955, for example, coal replaced close to a million tons equivalent of oil on the East Coast. Sizeable equivalent tonnages of gas were similarly replaced in the Great Lakes area. Also in the past year, the Tampa Electric Co. reported plans to build the first major coal-burning utility in Florida and the Gulf area.

Behind such shifts to coal power are these factors: (1) greater relative price increases in oil and gas, compared to coal, (2) diversion of oil and gas to more profitable markets, and (3) continued advances by coal and utility management in reducing mining costs and in improving the efficiency of coal-burning equipment.

COKE: Up 27% in 1955, Higher in '56

Coke ovens used 114 million tons of coal, or 27% more than in 1954, to supply needs of the steel, gas and chemical industries. Expected increases in steel production should boost coke oven use of coal to 119 million tons in 1956.

The record 1955 steel output of 117 million tons was based almost entirely on civilian demand, dispelling talk that steel prosperity was based on war. And looking ahead, the U. S. Dept. of Commerce in its 1955 year-end survey and forecast said: "The momentum of record-breaking steel production during the last half of 1955 will carry forward into the new year and make the first half one of the highest, if not the highest, in history. Any shutdowns required for repairs during the next 6 mo will be offset by the addition of new facilities."

A new method for using coal in the steel industry found its first commercial application during the past year. The Reserve Mining Co. opened its Silver Bay, Minn., plant which uses anthracite to pelletize taconite and bituminous to supply the electricity required. The Erie Mining Co. is scheduled to start up a similar plant in 1957. These two small plants are only the beginning of a new industry which will supply immense quantities of iron ore to steel furnaces, yet they alone will require 300,000 tons of bituminous coal annually.

INDUSTRY: Steady Rise Ahead; Oil Use Wanes

Responding to across-the-board improvement in business activity, the use of coal by general industry, including cement mills, was up about 10%, from 87 million tons in 1954 to 95 million tons in 1955. With business prosperity expected to continue, sales to this group should jump 5 million tons in 1956 and rise steadily in the subsequent years.

No major growth for oil and gas use in coal's general industry markets is seen during the coming year. In fact, where oil is concerned, some decline in use may result as reports indicate that producers of heavy fuel oil are shifting to other more profitable markets, such as asphalt and petroleum coke.

Greater demand for refining residues in more profitable markets has contributed to price increases in residual oil and to a shortage of locally-produced stocks. Between December, 1954, and December, 1955, residual fuel oil prices rose from $1.40 per bbl to $1.85 per bbl and stocks dropped by 10 million bbl. The effect that the local shortage will have on imports of residual oil bears close watching. But it could provide a timely opportunity for the bitumionus industry to move in and convert the affected industrial plants to coal.

Worthy of note, Bituminous Coal Research, Inc., announced early in the year the development of an automatic coal-fired package-unit steam generator, for commercial and small industrial applications. It is designed for process hot water, process steam and space-heating uses. Complete tests with a variety of bituminous coals were reported to be underway.

RETAIL: Fairly Stable; Future Challenging

Still an important segment of the total market, retail sales in 1955 were up about 10% to 57 million tons. A slight rise for 1956 and subsequent years in foreseen, probably reaching 60 million tons in 1959 and 1960.

A bigger increase in retail sales than indicated above could take place in the years ahead if newly-developed, modern space-heating equipment is aggressively merchandised. Offering the greatest promise is the new, improved Campbell coal burner which came off the production line in September, 1955. To thoroughly acquaint dealers with the new model, Automatic Solid Fuels Equipment, Inc., has announced plans for a series of field engineering and sales clinics starting March 1, 1956, in seven states of the bituminous area.

RAILROAD: Staging A Comeback?

Sales to railroads, now a minor coal market, declined slightly from 17 million tons in 1954 to 15 million tons in 1955. No major change in the picture is expected in the years immediately ahead although two favorable factors appeared on the scene during 1955:

1. A freight traffic increase brought some reconditioning of steam locomotives. With the level of national prosperity expected to go upward, at least through the first 6 mo of 1956, this trend should continue.

2. Bituminous Coal Research, Inc., announced in December that construction of the first coal-burning gas turbine locomotive is scheduled to start in 1957. If this venture proves successful, and indications are strong that it will be, the beginning of the end for the diesel locomotive will be underway. However, this possible eventuality does not mean a return of locomotive fuel to its former status as coal's biggest market since the new coal locomotive would only use 1 ton of coal to do the same work previously done by 4 tons.

EXPORT: Bulging, Perhaps Permanent

The biggest surprise of the year was the more than doubling of exports to overseas countries, from 15 million tons to an estimated 32 million tons. Including an estimated 17 million tons to Canada, total exports in 1955 were expected to hit 49 million. The year-end level of shipments indicated that 1956 overseas export would exceed 1955.

When the overseas market began to bulge to its present size, many thought the bulge was only temporary. It was felt that shipments would settle back to a much-smaller normal as soon as the foreign mines, particularly in Europe, got back into full production. But this did not happen and probably will not. Consequently, the European market begins to look at least semi-permanent for U. S. producers. And some observers see all-time record tonnages occurring in 1957.

The favorable export situation derives from the fact that all major world powers, except the United States, are short on energy reserves. Russia, including Poland and Manchuria, comes closer to self-sufficiency, but is hard pushed even to meet her own expanding needs. Japan and Korea look to the U. S. A., as do Brazil and other South American countries, but the big demand comes from Europe, including England, whose export coal trade was once a major factor in her world leadership.

Oil will make every effort to convert Europe to its product, following the pattern established in the United States in the past 35 yr. Homes, locomotives and industrial plants are the prospects. However, since most U. S. export coal is for metallurgical uses, it is not subject to oil competition, except tonnage to England which is primarily steam and house coal.

Rounding out the export picture, shipments to Canada might drop to 15 million tons in 1956 and settle during 1957 to 1959 at about 12 mil-

lion tons annually. The market in Canada is based largely on the ability of U. S. producers to deliver coal to heavily industrialized Ontario at lower prices than native coal moving from distant provinces. However, this advantage is being threatened by several gas pipe lines and the development of hydroelectric power along the St. Lawrence Seaway.

Markets Worth Watching

ALUMINUM: Picking Up Momentum Fast

ALUMINUM TOOK SHAPE this year as a market with one of the biggest growth potentials. The Reynolds Metals Co. announced plans to build a new 100,000-ton primary aluminum plant in the Ohio River Valley. The project calls for using coal as a source of power instead of hydroelectric energy as in most existing aluminum production. Mining facilities capable of producing 1,000,000 tons of coal a year are planned. Commenting on this feature, Richard S. Reynolds, Jr., president, said:

"An interesting by-product of this expansion program is the emergence of coal as a major source of electric energy for aluminum production. With vast deposits available in the United States, the improved efficiency of the latest coal-burning equipment is another assurance that this country can economically increase its primary aluminum output to meet growing long-range market requirements."

In line with the same thinking, reports indicated that Kaiser Aluminum & Chemical Corp. and the Olin Mathieson Chemical Co. would build coal-powered primary aluminum plants in West Virginia. Kaiser's plant will have an annual capacity of 220,000 tons and O-M's plant, 60,000 tons.

Coal for aluminum got another boost when the Pittsburgh Consolidation Coal Co. disclosed a plan for participating with the St. Joseph Lead Co. in the construction of an $85 million primary aluminum plant having an annual estimated capacity of 50,000 to 60,000 tons of ingot aluminum. Erection of the plant reportedly was contingent upon obtaining a "certificate of necessity" for a Federal tax write-off on much of the plant's cost. Significantly, plans call for locating the plant in the Ohio River Valley, where low-cost coal power can be integrated with the production activity. The proposed plant will require 1 million tons of coal for every 100,000 tons of aluminum produced.

CHEMICALS: Biggest Long-Range Potential

Interest in the exciting, long-range growth potentials of chemicals from coal was heightened with the following developments:

1. Commercial use of Union Carbon & Carbide's coal-hydrogenation process is not far away, perhaps not more than another year or so. In an October address, Dr. Joseph G. Davidson, Carbide vice president, said that modifications to the experimental plant had brought the company "very close to an economical solution of the problem."

2. "The chemical industry has a new raw material from which a long list of new and known products may evolve. This new material is a low-temperature tar derived from the carbonization of lignite at the Aluminum Co. of America's plant near Rockdale, Texas," according to a September news release from Alcoa. A number of blue chip chemical companies are already experimenting with the new raw material.

3. The Pittsburgh Consolidation Coal Co. announced Aug. 17 the acquisition of the Newark, N. J., plant of the Reilly Tar & Chemical Corp., which will be used to establish a modern cresylic acid refinery. A key factor in the development has been Pitt Consol's research in coal carbonization and refining of liquids obtained. This has resulted in a process for producing a new high quality cresylic and related materials. "While the process will enable us to use petroleum refinery waste streams as the primary feed material," the company states, "the Newark plant will also provide an outlet for the most valuable fractions of liquids from coal-carbonization plants. Our process of low temperature carbonization is now ready for commercial use. As such projects materialize, the liquids from carbonization plants can form the basis for further expansion of our chemical refining operations."

4. The Geneva works of the U. S. Steel's Columbia-Geneva Steel Div., near Provo, Utah, reportedly started construction of a 200 tpd anhydrous ammonia plant. The new installation is said to be the country's first in a major steel plant using raw coke-oven gas as the source of hydrogen for ammonia synthesis. The plant is expected to start a new trend in coal-chemicals recovery.

Noteworthy also was the opening in the Union of South Africa of the world's first large-scale, synthetic oil-from-coal plant. The economic justification of the plant rests mainly on two big factors: availability of thick seams of cheap coal at a shallow depth, and the existence of heavy freight charges for transporting refined petroleum products from coastal points to the Johannesburg area. Since oil reserves face possible depletion in the United States during the next 25 yr, the Union of South Africa plant could be the forerunner to similar projects i.. this country.

Problems and Progress

COMPETITION: Definite Gains

DEMAND FOR OIL AND GAS in 1955, each up 8% over the previous year, hit new highs of 3,066 million bbl and 66.5 billion therms, respectively. In spite of the increases, which generally reflect record national prosperity, coal made definite gains on both oil and gas—enough to suggest that the competitive peak has been reached. This does not mean an immediate flood of new business for the coal industry. But it does mean the development of a climate in which low cost, high quality and modern burning equipment, backed up by expanded research and hard-hitting merchandising, can begin to regain old business and create new at a faster pace.

Among the significant gains made by coal was an increase in its share of the utility market from 65% to 69% during the first 7 mo of 1955. This could well reach, and possibly exceed, 70% when figures are available for the entire year. Oil's share dropped only a fractional per cent but gas' share fell 3.5%.

Also worth noting, the price of residual fuel oil rose from $1.40 per bbl in December, 1954, to $1.85 in December, 1955, reflecting a shortage of local stocks and a growing preference by refiners for more profitable markets such as asphalt and petroleum coke.

The strong opposition of public officials testifying on the proposed legislation exempting natural gas producers from Federal regulation confirmed publicly the suspicion that the natural gas honeymoon was over. Francis T.

How the Top 15 Coal-Producing Groups Ranked in 1955

Compiled by Keystone Coal Buyers Manual, A Coal Age Affiliate

GROUP OR COMPANY	1955 Tonnage	% Change 1954 to 1955	1954 Tonnage	% Change 1953 to 1954	Standing 1955	1954	1953	1952
Pittsburgh Consolidation Group*	28,001,044	+22.2	22,916,792	−15.8	1	1	1	1
U. S. Steel (c)	25,159,319	+11.0	22,677,697	−12.9	2	2	2	2
Peabody-Sinclair-Southern*	13,663,920[1]	+95.1	6,999,976	−29.5	3	8	3	4
Island Creek—Pond Creek*	10,247,134	+26.8	8,079,524	− 9.0	4	5	6	6
Bethlehem Steel (c)*	9,886,274	+22.5	8,068,600	−17.5	5	6	4	9
Eastern Gas & Fuel	9,307,068	+14.4	8,138,375	−14.2	6	4	5	3
Pittston Group*	8,058,130	+24.0	6,499,633	−24.0	7	9	8	7
Pocohontas Fuel*	7,968,603[4]	+30.1	6,122,078	+ 3.0	8	10	11	10
Truax-Traer	7,661,498	+ 6.3	7,203,610	− 9.3	9	7	9	8
Freeman*	6,550,000[2]	+121.0	2,959,059	− 7.3	10	23	26	37
Republic Steel (c)*	5,832,513	+61.2	3,617,433	−77.5	11	17	10	14
Sinclair-Southern Group	5,660,837[3]	[3]	8,320,690	− 5.0	12	3	7	5
North American Group*	5,330,895	+39.0	3,836,559	−13.9	13	14	14	12
Jones & Laughlin Steel (c)	5,313,434	+ 8.6	4,892,317	−10.3	14	11	12	18
Berwind-White	4,895,840	+10.8	4,418,572	−16.4	15	13	13	11
Total	153,536,509	+22.9	124,750,915					

(c) Captive.
*Percentage Change, 1955–54, Better than National Average of 18.6% increase.
(1) Includes Sinclair-Southern figures after merger, July 11, 1955.
(2) Includes Chicago, Wilmington & Franklin Coal Co., whose 1954 production was 3,274,337.
(3) Production only before merger, July 11, 1955.
(4) Includes American Coal Co. of Allegany Co. after Merger July, 1955.

COLLECTIVELY, the industry's 15 top producing organizations in 1955 mined 33.0% of the total bituminous and lignite mined. Their 1955 tonnages totaled 22.9% above 1954, compared with an 18.6% increase for the industry as a whole. Output of the 15 ranking groups in 1954 totalled 126,569,179 tons or 32.2% of the total. Some changes can be foreseen for 1956 because of mergers. Red Jacket mines (acquired by Island Creek as of 6–1–56, produced 3,043,866 tons in 1955. The Peabody-Sinclair picture is shown complete above. American Coal Co. produced 495,722 tons before the merger. West Kentucky Coal Co. and Nashville Coal Co. (acquired 10–1–55) produced 7,493,197 tons in 1955. No anthracite company ranked with the top 15 in 1955.

Mylott, New York State Public Service Commission, noting that 4,000,000 consumers in New York state had converted to gas under assurances that it would be cheap and abundant, made this point: "The producers and pipeline companies devoted their facilities to the public service and obtained a captive market. We cannot stand idly by and permit them to fleece it." Mayor Wagner, of New York City, said that in the 5 yr or so "since the use of natural gas was first taken under consideration for the City of New York, in the belief that its use would provide a more economical source of fuel, the cost has risen 44%."

While severe competition with oil and gas has generally passed its peak, thorny problems still remain. Residual oil imports are down but not yet to the cabinet-recommended level consistent with national defense. Compulsory government curbs are in the picture if the ODM's plea for a voluntary cutback by oil importers did not bring a 7% reduction in crude oil imports during the last quarter of 1955.

Coal's fight to stop raiding of its boiler fuel markets by natural gas, as sanctioned by the FPC, will continue. Joined by railroad and labor interests, coal must also gird itself for battle on proposals to transmit natural gas to and from Canada.

On the atomic energy front, there is no cause for coal to fear competition from nuclear power during the foreseeable future, and, possibly never. If the country's electric power needs are to be met in 1975, annual coal use for power by that time must climb to 430 million tons, or more than three times current usage. However, a favorable outlook at present does not mean that the industry can "rest on its oars." A vigorous program of action has been proposed to solidify the industry's competitive position through reduced mining and delivery costs (*Coal Age*, January, 1955, p. 54).

TRANSPORT: Headache With Possible Cures

Moving coal from mine to market will continue as the industry's No. 1 headache in 1956. The headache stems principally from ICC actions in 1955 which (1) sustained rail freight increases on fine and lump coal moving to Lower Lake ports, (2) made permanent a temporary 12% to 15% general freight surcharge won by the railroads in 1952, and (3) gave rail carriers the green light for another general 7% rate hike, scheduled to become conditionally effective Feb. 25, 1956. Tom Pickett, NCA executive vice president, described the latest rate increase as "unreasonable in the light of the fact that railroads are today in the strongest financial position in history." They had a record net profit of $915 million in 1955.

Adding to the transport headache was the continuing shortage of cars. Railroads are expediting efforts to solve this problem, although substantial relief is not expected until at least mid-1956. As of Dec. 1, 1955, there were 7,364 gondola cars and 32,746 hopper cars "on order and undelivered."

On the brighter side, the Chesapeake & Ohio announced in November a $2.5 million expansion of Newport News coal-dumping facilities. These are scheduled for completion in

1956 to handle increasing exports from the port which amounted to 10 million tons last year.

Perhaps not the cure-all but certainly a palliative for transport headaches is the increasing trend toward new, alternate and substitute methods for moving coal. In July, the USBM announced a project to study the feasibility of piping low-grade Rocky Mountain coals to industrial areas. An October report indicated that construction had begun on Pitt Consol's 106-mi coal pipeline from Georgetown, Ohio, to Eastlake, Ohio. Also in the 1955 picture, aluminum companies (1) disclosed plans to locate new, coal-consuming plants near mine sites in the Ohio River Valley, and the Dravo Corp. (2) reported building 73 open-hopper river barges to handle increased river traffic, principally coal on the Ohio River.

MANAGEMENT:

Organizing For Profit

Management stepped up plans and activities to meet increasing demand, strengthen competitive position, and broaden the base of company income.

The big jump in coal production brought into focus the pressing need for expanding mine capacity. In the last 5 mo of 1955, *Keystone Coal Buyers Manual* reported that new large deep mines under development totaled almost 10 million tons of production capacity. This 5-mo total exceeds the combined total for the 3-yr period, 1952 to 1954. Figures on new strip, auger and small deep mines, not available, would make the 5-mo total more impressive.

Still greater increases in new capacity, however, must be added to normal replacement of exhausted mines if the industry is to stay 10% ahead of demand, which should hit 600 million tons by 1960. These increases should average 22 million tons annually for the next 5 yr and will require an estimated annual average investment of $176 to $200 million (*Coal Age*, November, 1955, p. 56).

Notable among mergers was that of the Sinclair Coal Co. with the Peabody Coal Co., which made the latter the Nation's second largest coal producer with an output of about 20 million tons a year. Through buying the Nashville Coal Co., the West Kentucky Coal Co. will have an expected output of 8 million tons. Pond Creek Pocahontas Co. and the Red Jacket Coal Corp. joined forces with the Island Creek Coal Co. to give Island Creek an estimated production of 14 million tons.

Companies seeking to diversify their interests found Pitt Consol buying a chemical plant in Newark, N. J., and joining with Freeport Sulphur Co. in a $19 million potash development project at Carlsbad, New Mexico. Sinclair & Hildredth Mines, Inc., an affiliate of Sinclair Coal Co., opened offices in Gunnison, Colo., to engage in uranium mining. The Glen Alden Corp. purchased (1) Mathes Co., a Fort Worth, Texas concern making heat pumps, air conditioners and room coolers; and (2) Ward LaFrance Truck Corp., a manufacturer of fire apparatus and emergency rescue cars. The Philadelphia and Reading Corp. bought the Union Underwear Co., Inc., reputedly the largest manufacturer of underwear in the United States.

More effective merchandising was high on management's agenda in 1955 as it will continue to be in the years ahead. Growing appreciation of the value of the engineering approach as an effective market builder was shown in the appointment of Julian E. Tobey, Jr., as director of engineering for the Indiana Coal Association. In this position, he will work toward development of a broader market for Indiana coals through engineering advisory service to consumers and prospective users, and through collaboration with consulting engineers, architects and equipment manufacturers.

In a number of cases, organized "Minute Men" took the coal sales story direct to school and housing authorities and converted them from oil to coal use. The "Anthracade," a mobile display of automatic anthracite heating units, did an equally effective job of promoting hard coal use for space heating in homes and office buildings.

LABOR FRONT: Aggressive But Still Peaceful

Without fanfare, the Nation's bituminous operators and the UMWA agreed in August on a record $2 pay raise and other benefits. The peaceful negotiations reflected operators' optimism over the industry's future, as well as their increasing recognition that labor is entitled to a fair share of the fruits of greater production. The 1955 wage hike will take care of labor's needs temporarily, probably through 1956, unless the accelerated trend in production should reach beyond present expectations.

Close in the wake of the pay increase, northern bituminous operators raised prices from 25c to 45c a ton and southern operators, 46.4c and 52.1c a ton. Another less tangible effect will be an intensified drive to take labor out of the mine price of coal. This means more mechanization and higher output per man day.

Also important on the labor front, Secretary of Labor James P. Mitchell issued a minimum wage order which became effective in September for soft coal mined on government contracts. The primary target of the action was the TVA, which has been charged with depressing the industry in general by purchasing coal from mines operating with sub-standard wage scales and safety.

LEGISLATION: '56 Critical for Coal

The administration's "Report on Energy Supplies and Resources Policy," released Feb. 26, 1955, backed many steps coal has long been advocating to eliminate discrimination, restore competitive fairness and maintain strength for national defense (*Coal Age*, April, 1955, p. 84). Its recommenadtions, however, have yet to gain full effect. The NCA says the coal industry in 1956 will continue to urge the administration and Congress to take action for:

1. A cutback in foreign oil imports, which are still excessive.
2. Enactment of amendments to the Natural Gas Act providing for conservation of dwindling natural gas reserves and a Federal Power Commission policy against dumping of natural gas under industrial boilers.
3. Reductions in "exorbitantly high" railroad freight rates.
4. Changes in government purchasing policies to end discriminations against coal.
5. A Federal policy on atomic energy for commercial purposes that will avoid the use of public funds to establish government-owned or government-subsidized plants for the commercial production and sale of nuclear power.

Adjourning last August, Congress left considerable unfinished business of interest to the coal industry for action in the current session (*Coal Age*, September, 1955, p. 132). Most controversial item on the docket—up for early action—is the House-approved Harris bill to exempt natural gas producers from direct federal regulation. Other matters include the transportation tax on coal, Social Security benefits and costs, federal and state cooperation in controlling water pollution, proposals to define the Labor Secretary's authority in making industry- or area-wide minimum wage determinations, and the construction of new TVA steam plants.

How McGraw-Hill Economists See . . .

Business in 1956

By ROBERT P. ULIN
And DORA K. MERRIS
Department of Economics, McGraw-Hill Publishing Co., Inc.

The business boom which rolled up all sorts of production records last year may level off in 1956, but it won't collapse. Industrial production in the first quarter of this year is running slightly below the record set in the closing months of 1955. But production should be relatively stable through the rest of the year, and on this basis 1956 will average out as well as, or slightly better than, 1955, when production had to pick up from a low level.

That is in terms of physical output. In dollar volume, business will be rising moderately all year. The reason is higher prices. With prices up, gross national product—that's the dollar output of all the goods and services produced in the economy—will be over the $400 billion mark in 1956. For 1955, GNP was $387 billion.

But 1956 is slated to see more of a boom in heavy goods, less in consumer items. Last year the big kick for the economy came from the consumer. His income was high. And he was in a mood to spend it on "big ticket" items. So automobiles, for instance, were produced and sold in all-time record numbers. Housing starts climbed close to the record set in 1950. These and other consumer durables accounted for about $8 billion of the $33 billion increase in total business activity last year.

This year the consumer may be in a less spendthrift mood—at least so far as making big purchases is concerned. His income will remain high, and he will probably spend freely on soft goods and services. But sales are off already for autos and housing. The big boost this year is from the machinery and heavy construction industries. Business plans to spend $33 billion this year to modernize plant and equipment and to expand capacity, according to a McGraw-Hill survey. This is a 13% increase over last year. Commercial building and highway and school construction will take up some of the slack left by fewer housing starts. In fact, the dollar volume of all construction will exceed last year's, though physical volume may be somewhat lower.

The altered pattern of business activity this year will have a considerable effect on individual industries. Overall, heavy industry will be operating at close to capacity, and this includes the big users of industrial fuels.

Steel, for instance, will probably turn out as many tons of ingots and castings as it did last year in spite of the fact that its big customer, the auto industry, is expected to operate at a more modest rate. Other buyers—heavy construction, industrial machinery and freight car producers—will make up the difference. If steel again this year pours out close to capacity tonnage—probably about 116 million tons—blast-furnace production of pig iron should follow along at close to capacity of about 85 million tons.

Nonferrous metals will be in strong demand, and probably add some small gains to last year's spectacular 20% production climb.

Some construction materials—cement, brick, gypsum—being particularly sensitive to residential construction, may fall short of last year's production records. New highway construction, however, will do a lot to keep the **cement** industry busy.

The chemical industries will chalk up a 10% gain in output this year. This comes on top of one of their biggest years in 1955.

Paper production has historically followed general production trends, because of packaging demands. This year should fit the pattern, and carry the industry to probably a 5% higher production level.

All these heavy industries will make big demands on the **electric** utilities for power. Utilities are expected to produce 587 billion kwh of electricity this year, or about 7% more than last year. Manufacturing industries will require nearly half of this, about 260 billion kwh. New residential customers and old ones with energy-hungry appliances will also raise their requirements—perhaps to 135 billion kwh—about 11% over last year.

Beyond next year, the outlook for business and for industrial fuels looks highly promising. The economy has been growing on the average of about 3% a year in terms of gross national product. This rate should continue. And manufacturers' plans, already underway, will mean more new plants and expanding power use through 1957.

Business Investment Holds Key To Both Growth and Stability

What federal tax policy will best promote both growth and stability in the American economy? The Joint Economic Committee of Congress has been asking this crucially important question in public hearings. This editorial suggests one vital part of the answer.

The proposition advanced here is that—

> Tax policy must encourage a continuing high level of business investment in new plant and equipment, because such investment makes a special contribution to *both* economic growth and economic stability.

Growth Needed for Security

We must have both growth and stability.

A vigorous economic growth is essential to our national security. As Congressman Wilbur D. Mills said in launching the Joint Committee's hearings, "The present complexion of world affairs places a premium upon strength and growth in our national economy." Growth is likewise a major ingredient of a healthy domestic economy. Growing enterprises and growing communities offer far more opportunities for satisfying careers than those which are not growing.

A reasonably stable economy, without violent ups and downs, is also essential to our national welfare. Extravagant booms and their more or less inevitable result, severe depressions, waste labor and resources and cause great human misery. Both major political parties have accepted the obligation imposed by the Employment Act of 1946, that the federal government work to maintain high and stable employment.

There is general agreement that **the key to economic growth is investment in new plant and equipment.** Growth depends decisively on new facilities to increase production, and also to produce new and better products in new and better ways. At the same time, new plant investment provides employment for the important, and well-paid, one-fourth of our industrial workers who manufacture and build new production facilities. So if the process of business investment is kept on an even keel, the result is not only growth but also stability in a substantial sector of our economy.

But authorities disagree on the possibility of maintaining a high level of business investment for any great length of time. Some fear that it will lead to an excess of producing capacity and the glutting of markets, with recession or depression not far behind.

The history of our country offers some basis for the fear that it is dangerous to maintain a very high level of business investment. There have been times when the economy has suffered under the weight of excess producing capacity. **This fear, however, has been made obsolete by the recent course of our economic history which, in its earlier phases, nourished the fear.**

The World Has Changed

Here are some of the major considerations, cited at the Joint Committee hearings, which support the conclusion that we not only *can have* a high level of business investment and economic stability but that we actually *need* a high level of such investment to assure stability.

(1) Over the next 20 years our population is expected to increase by about one-third. But most of the population increase will come in age groups younger or older than normal working ages, and people will probably work fewer hours per week. Thus hours worked are not expected to increase more than 15%. Consequently, we must have a relatively large increase in the amount of production equipment per worker if our standard of living is not to suffer. This means a high level of new investment.

(2) About half of our present business investment goes to replace worn-out equipment, rather than to expand capacity as was true during the early stages of our industrial development.

(3) Thanks largely to the impact of organized research—for which we as a nation now spend about $4 billion a year—a large share of capital investment now goes to provide new products and new processes, rather than to expand existing capacity.

These developments make it unlikely that we shall develop the burden of excess capacity that plagued the economy in earlier periods. **Moreover, most capital investment plans are now made on a long-range basis. Companies are building facilities to anticipate their needs for several years ahead.** This increase in long-range planning has reduced the disturbing effects of temporary shortages and excesses in producing capacity.

The record of recent years speaks for itself. Business spending for new plant and equipment in 1955 was over $29 billion. This continued the high level of investment that has been maintained for the past ten years—a decade remarkable for both impressive growth and gratifying stability. A McGraw-Hill survey of preliminary plans for 1956 indicates another year of increasing investment, and expanding business activity.

Tax policy, to be successful, must consider this impressive contribution of business investment to both growth and stability.

Of course, the level of investment depends on many factors other than federal tax policy. The degree of business confidence is important. So is the strength of consumer markets. So is the attitude of organized labor toward the use of more efficient machinery. But tax policy is a crucially important factor. And it is becoming more so with new developments in our changing economy. These developments indicate that tax policy **must be geared to foster a high level of business investment, if the dual objectives of economic growth and economic stability are surely to be attained.**

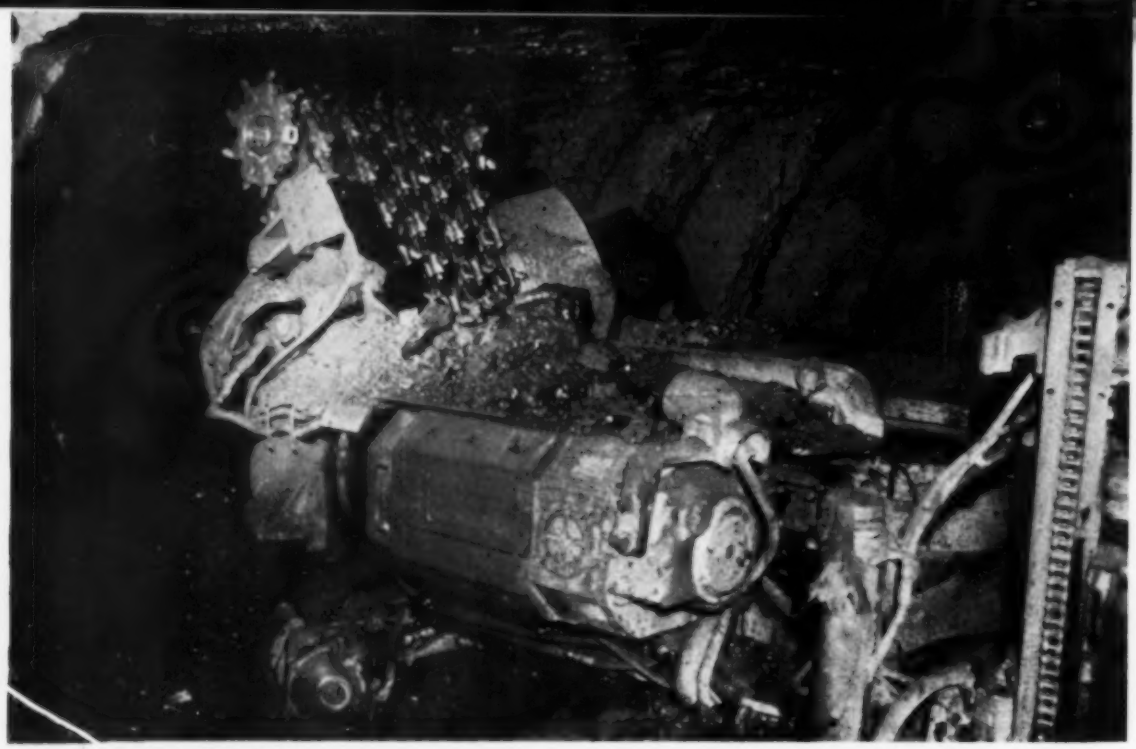
This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.



CONTINUOUS MINING became more nearly continuous in 1955 through development of . . .

Mining Progress in 1955

Development and application of equipment and methods kept pace with production increase in 1955. Deep mining, stripping and preparation shared in the increased interest in attaining maximum efficiency.

Deep Mining

NEW DEVELOPMENTS in equipment and methods for deep mining came along in 1955 at a rate surpassing even the bituminous industry's storied production rise. This activity is reflected not only in the 73-million-ton bulge over 1954 in total production, but also in the sharp increase in productivity as measured in tons per man shift. The bulge in production is in part a reflection of the lower cost growing out of higher tons per man, increasing coal's advantage in the market place. Closing the circle, the increased productivity is a direct result of the development of more efficient equipment and the application of new and better ideas for mining and transportation in underground work.

Frontrunner among the 1955 developments is the interest shown by coal producers and equipment manufacturers in streamlining continuous mining with respect to application and design of the machinery. New types of machines and improved models of earlier machines showed their stuff in actual production, with reports of operations, forthcoming in 1955, telling of higher and higher unit-shift tonnages and fuller productive use of total shift time.

Concentrated effort to eliminate the the bugaboo of inadequate transportation in back of the continuous-mining machine bore fruit in 1955. New extensible conveyors operating at higher belt speeds, and integrated systems featuring bridge conveyors across the one remaining gap in the lineup, gave fuller meaning to the word continuous as the industry would like to know it.

Ramifications resulting from the employment of these newer methods touch all phases of coal production. For example, rockdusting procedures had to be revamped if the dusting operation was to keep pace with the rapidly advancing mining machine as it was serviced by the newer, faster transportation units. Openings in continuous-mining sections now can be advanced more than 40 ft per shift, which is the Bureau of Mines limit on permissible non-rockdusted length of opening.

The upshot was that as soon as the need was recognized an intensive research program was organized in an effort to bring rockdusting in tune with the continuous-mining cycle. The Bureau of Mines, equipment manufacturers and coal producers worked hard at the job of developing a safe, compatible system of applying wet rockdust to permit in-cycle application while eliminating the vexations of dry rockdust in the air at the face. New types of rockdusting machines are one result of the research, indicating the far-reaching effects accompanying a change to continuous mining.



NEW TYPES of conveyors up to the face.

Roof-control operations have felt a similar impact. Faced with the double demand of providing safer and faster roof control, the industry once again has turned to its drawing board and its best laboratory, the production cycle, to design and test better machines and methods for roof-bolting. Improved rock bits, new roof drills featuring variable pressure and adjustable speed of rotation, redesigned stopers permitting longer holes to be drilled in thin seams, and new types of expansion shells leading to better preassembly of bolts are among the valuable results of the effort. Here again, the project is geared to the potential pace of continuous mining, with everyone taking a willing new look at the problem.

The use of continuous machines with roof-bolt drills mounted at the sides spread to more operations, and one company reportedly was working on the development of a special surge car with twin booms mounted on the front bumpers of the car to install the bolts.

From other quarters came news of successful continuous mining on AC power at 440 v, as fully described in a feature article in this issue beginning on p 88.

All things considered, continuous mining in 1955 had its greatest growth year so far. It caught hold in the central Pennsylvania fields, for example, promising help in this area where competition with other regions is keen, if not hair-raising.

CONVENTIONAL CYCLES: Streamlined for Higher Productivity

The emphasis on gearing auxiliary operations to the tempo of continuous mining spilled over into conventional systems operated by companies whose markets or natural conditions precluded a switch to full continuous mining. In-cycle rockdusting and faster roof bolting, for example, permitted more cuts per shift to be loaded out. New types of loading machines and improved electric and hydraulic coal drills also made their presence felt.

In parallel efforts, the industry found more ways to apply new materials in drainage and ventilation installations to reduce labor costs in maintaining these services. Lightweight pipe, faster couplings, reclaimable material for stoppings, and improved ventilating doors and overcasts appear in this list. Labor savings here added still more to the productivity gains made at the face.

Other companies achieved higher productivity by changing mining methods. In one instance a Pennsylvania producer used an extensible conveyor to work rooms 900 ft long, thus substantially reducing the amount of development work required to recover a block of coal. Another company converted from conventional room-and-pillar mining to a system of driving multiple entries (*Coal Age*, September, 1955, p 78). The result of this and other changes was that 295 employees produced 3,800 tpd against a previous average of 2,900 tpd for 400 employees.

Faster entry-development was made possible at an Indiana mine through the development of a shop-made pit-car loader designed for fast tramming in 45-in coal (*Coal Age*, September, 1955, p 72). This single unit eliminated a lot of top-rock shooting and ramp building, and smoothed out the entry cycle.

A mine in Kentucky realized cost benefits by installing 25-ton mine cars on a high-speed main haulage underground. The advantages were compounded by the installation of an automatic car-loading system, permitting the entire main-haulage system, to be operated by one man, the locomotive operator. The story appeared in *Coal Age* in January, 1956, p 70.

PITCH MINING: Airway Boring, Longholing

Not to be outdone, operators contending with pitching seams came up with new and better methods of their own. A unit developed in western Canada bores ventilation raises and connecting holes from 20 and 36 in in diameter and up to 100 ft deep on pitches of from 45 to 90 deg. This lightweight machine (*Coal Age*, August, 1955, p 58) materially reduces the cost of driving such openings and makes a decided contribution to safety by making it unnecessary for men to work in such openings.

In operation the borer is suspended from the roof in a lower opening or, as an alternative is mounted on a stand. A 2-in pilot hole is drilled up the pitch to intersect a parallel opening higher up the pitch. A winch is installed in the upper opening, and the hoist cable is passed down through the pilot hole to be attached to the large diameter boring head. The winch then pulls the boring head up the pitch while the drive unit, in the lower opening, imparts the rotary motion to the head. The 10-hp drive unit weighs only 1,700 lb, making it relatively easy to move and install.

In the southern anthracite region, a longhole system of recovery, using a new rotary air-powered drill to make 50-ft holes up through the coal, led to a productivity of 23 tons per man shift in a 5½-ft vein.

The coal is transported on chain conveyors discharging through a counter chute into a skip-loading pocket at the bottom of the slope. Benefits are lower timber costs, simplified ventilation, increased coal recovery and greater safety for the workmen (*Coal Age*, April 1955, p 70).

(*Continued on next page*)



STREAMLINED AUXILIARY operations, including wet application of rock dust, are designed to eliminate delays from continuous-mining cycles.



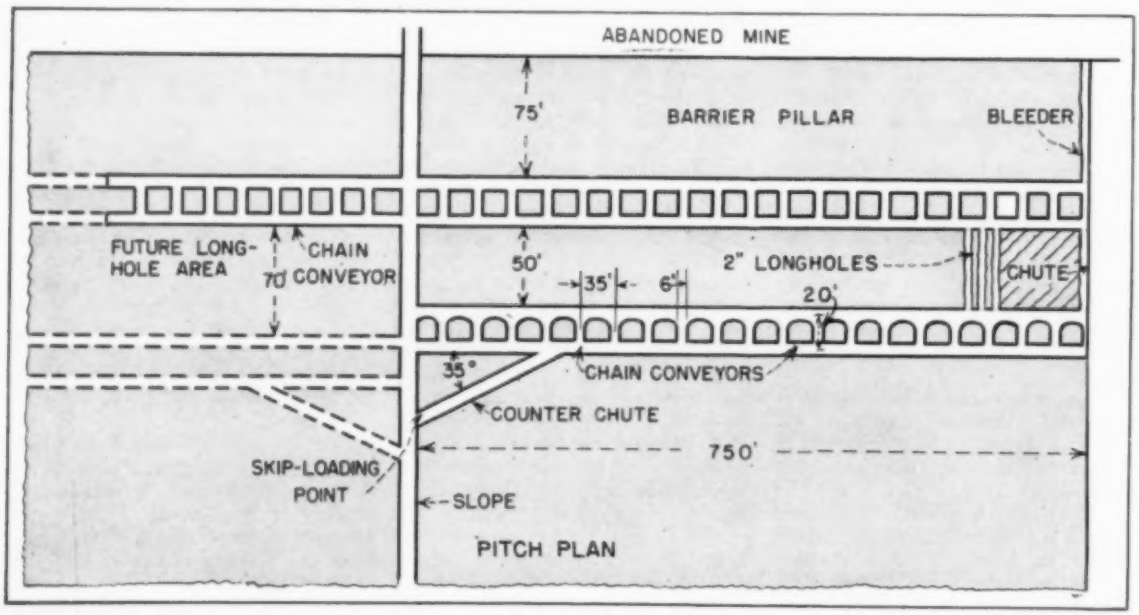
UP-TO-DATE MACHINES and new mine projections have been instrumental in keeping conventional mining in the race for high productivity.

CONVEYOR MINING: More Efficiency, Higher Output

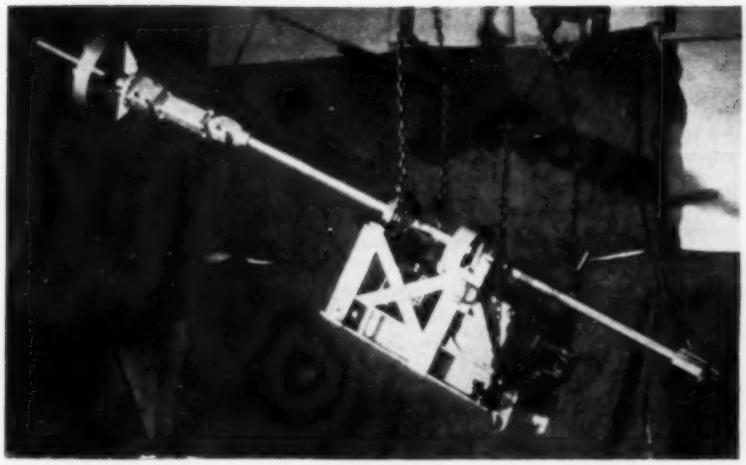
Several noteworthy developments in conveyor mining were in the news in 1955. A British-made snaking conveyor for longwall mining helped Nova Scotia miners raise output from 40.8 tons per face man on the mining shift to 49.33 tons. The flexible conveyor replaces a face belt formerly used with longwall continuous-mining machines to reduce the amount of labor required to keep the conveyor up close to the face (*Coal Age*, November, 1955, p 76). The mining machine in tramming back up the long face to start another cut supplies the power for pulling the conveyor up to the face.

Normal time required to pull up the conveyor along a 500-ft wall is 2½ hr. The job is handled by the regular offshift crew of mechanics and face timbermen, releasing 6 to 8 other men formerly required for moving the conveyor up to the face after each pass.

At a Pennsylvania bituminous mine a system has been developed in which 4-man crews in room work in a 33-in seam produce up to 94 tons per shift (3½ cuts) using ratchet sawbills and shaking conveyors. An average 240-ft room is driven up and the pillar extracted and the equipment moved to the next setup in 9 days of double-shift operation. Multiple blasting with millisecond delays, tamping plugs and ceramic insulators has contributed to



LONGHOLE MINING with new drills and conveyor transportation resulted in an output of 23 tons per man day in a steeply pitching anthracite vein. Improved drill bits and rods also contributed to this increase in productivity.



SHOP PHOTO of lightweight boring machine for making openings in pitching seams shows how unit is suspended by chains from roof in operation.



RELOCATED PORTALS reduced travel time as much as 45 min per shift.

overall efficiency. Steps like these permitted the mine to continue operations by soliciting and serving new customers when its former major market, railroad fuel, fell off (*Coal Age*, July, 1955, p 64).

In anthracite, chain conveyors in chambers and airways, shakers and duckbills in headings, scrapers in pillar recovery and belts for panel and slope transportation were combined on a 12% pitch at one mine. As described in the July, 1955 issue, p 74, the work is a combination of up-pitch and down-pitch recovery, both adequately served by the various types of conveyors. The up-pitch portion of a panel is recovered on advance and the down-pitch portion on retreat.

HANDLING MEN: More Time at the Face

The problem of reducing travel time was attacked with renewed vigor in 1955. Relocated portals equipped with efficient hoists were constructed at a number of mines. One such installation at a mine in Kentucky cut travel 30 min per shift, a respectable increase in available working time. Corollary benefits are more adequate facilities for the men and supervisors, bringing the advantages that come from more comfortable working conditions, and an improved supply handling system since the supply depot is closer to the active workings. The beauty of the new portal is that it was built at low cost for a mine having a limited life (*Coal Age*, December, 1955, p 62).

At a West Virginia mine, a new manshaft was instrumental in reducing travel time 45 min per shift. The new shaft is a 72-in borehole topped by a friction hoist operated automatically (November, 1955, p 60).

And taking steps to cut the cost of sinking such auxiliary shafts, an Ohio company rolled up to the shaft site with a rotary overburden drill to make a ring of large-diameter holes. These drill holes provided relief against which the shaft rock could be shot without damage to the remaining shaft walls when the job was done. The savings, as described in our April, 1955 issue, p 74, are substantial. At some belt-conveyor mines, men are transported in special man cars traveling on the parallel supply track.

Viewing the year as a unit, however, the big news still is continuous mining, especially since a West Virginia mine reports productivity records of 69 tons per man shift, at the face, in the Pittsburgh seam, as a sustained monthly average. Others, in all areas of the country, were coming up with gratifying figures as a regular thing.

But solutions beget problems, and as 1956 opened the industry still had some hard ones to crack.

1956 PROBLEMS: Still to Be Solved by Coal

Better roof control, a perennial but nonetheless pressing need, will require redoubled effort in 1956 toward the goal of developing better protection at the immediate face area for the men. The roof-fall toll is entirely too high to be tolerated. Stricter supervision, more knowledge of roof behavior and better equipment and methods contain the seed of the solution, but the need for progress is immediate.

Training for deep-mine operations will have to get a big play in 1956. There seems to be a meeting of the minds that a continuous-mining machine will need a major overhaul after each 100,000 tons of production. Some units on double-shift operation are making this tonnage twice a year. With perhaps 500 machines now in use it is apparent that a host of highly-trained mechanics and electricians will be needed to keep continuous mining humming along at its present rate. In this regard, top management must take interest in setting up effective supply procedures and in maintaining a reasonable inventory of the parts that will be needed for such overhauls.

Effective grounding for off-track equipment received a boost through the development of a protective device which detects ground faults, cutting off power to a machine to prevent electric shock. Designers now are wrinkling their brows trying to come up with an effective device that also will protect the trailing cable, if this is possible.

Stripping

NEW MACHINES designed to handle deeper overburden faster and development of new blasting agents to cut mining costs marked the past year in strip mining. Additional gains were made by rotary dry-type overburden drills in both large self-propelled and smaller truck-mounted units. A new high in shovel capacity was reached as the first 60-yd unit neared completion in Ohio. Increasing use of stripping auxiliaries was marked by growing popularity of the wheel ex-

cavator. Operating voltage for large strip shovels reached a new high with the first application of 7,200-v power to the 60-yd Ohio shovel. The dragline retained its solid position as a spoil handling unit, particularly in anthracite pits. Bituminous output continued to be recovered mostly by contour stripping and anthracite production came primarily from following the pitch of the bed.

LOWER COST: Goal in Overburden Preparation

More and more vertical dry-type drills appeared in pits where overburden was becoming thicker and tougher. Highly mobile horizontal drills remained a strong contender in the thinner cover and where unusual conditions required a combination of horizontal and vertical drilling. At one anthracite operation two large vertical drills teamed with high-capacity draglines permit the company to rework strip areas at depths far beyond the economic limit of the old operation. Six men use the new drills around the clock to sink 12¼-in blastholes, whereas 25 men were needed with churn drills, (*Coal Age*, January, 1955, p. 64).

A new rotary dry-type bit designed specifically for overburden drilling has been undergoing tests for some months and offers advantages that may reduce bit costs for rotary vertical drills significantly. Features of the bit include cones that can be replaced without removing the bit from the drill stem and lubricated bearings that last for the life of the bit.

Development of Akremite as a blasting medium provided operators with another effective weapon in the drive to cut the cost of overburden preparation. Aside from a lower initial cost, the new blasting agent has produced better fragmentation, thus enabling the stripping unit to move more material easier. As a result of the easier digging maintenance needs have been lowered and down time has been reduced. A full description of Akremite was published in the May issue of *Coal Age*. Detonating fuse and MS connectors also were used more widely in the effort to improve fragmentation and reduce vibration.

STRIPPING LIMIT: Pushed Back By New Units

The birth of the 60-yd stripping unit marked a new high in shovel capacity. An estimated 3½ million tons of coal were added to the reserves of the Ohio company installing the new unit, which will work beyond the economic limit set for the present 45-yd shovels. Power consumed by the big shovel is reported to be enough to supply the needs of a town with 6,000 people. Because of this new high in power requirements, energy is supplied at a new high of 7,200 v.

Successful development and application of the wheel excavator for use in strip mines in this country also marks another forward step in stripping progress (*Coal Age*, March, 1955, p. 58). Three goals in the development of the wheel were: (1) to handle up to 85 ft of overburden and place the spoil far enough back to avoid slides; (2) to cut the cost per cubic yard of material moved below those possible with existing machines of the same size; and (3) to leave any overburden not moved by the machine so low in height that the efficiency of the accompanying shovel or dragline would be increased.

New Bituminous Preparation Facilities in 1955*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Black Diamond Coal Mining Co.	Black Diamond, Ala. (2)	20	Deister Concentrator[1]
Bethlehem Mines Corp.	Nanty Glo, Pa.		Roberts & Schaefer
Big Ten Coal Co.	Lewistown, Ill.	225	Daniels[1]
Blue Bird Coal Co.	Carrier Mills, Ill.	60	Heyl & Patterson[1] Deister Concentrator[1]
Cannelton Coal & Coke Co.	Cannelton, W. Va.		Heyl & Patterson[1] Kanawha[1]
Carbon Fuel Co.	Dow Fork, W. Va.		Kanawha[1]
	Winifrede, W. Va.	300	McNally Pittsburg[1]
Christopher Coal Co.	Morgantown, W. Va. (12)	720	Heyl & Patterson[1]
Clinchfield Coal Corp.	Dante, Va.	450	Link-Belt[1]
Colltown Mining Co.	Madisonville, Ky.	10	Heyl & Patterson[1]
Columbia-Southern Chemical Corp.	Midvale, Ohio	40	Heyl & Patterson[11]
Compass Coal Co.	Dola, W. Va.	50	Dorr-Oliver[13]
		100	Link-Belt[13]
Consolidation Coal Co. (W. Va.)	Byrne, W. Va.	300	Roberts & Schaefer[1]
	Byrne, W. Va.	285	Combustion Engineering[14]
	Byrne, W. Va. (23)	200	Deister Concentrator[1]
Crichton Coal & Coke Co.	Heshbon, Pa.	100	Wilmot[15]
Crozer Coal & Land Co.	Springton, W. Va.	150	Roberts & Schaefer[1]
DeKoven Coal Mining Co.	DeKoven, Ky.	1,000	Roberts & Schaefer[1] Heyl & Patterson[1] Jeffrey[17]
W. G. Duncan Coal Co.	Greenville, Ky.	175	McNally Pittsburg[1]
Eastern Coal Corp.	Stone, Ky.	180	McNally Pittsburg[1]
		120	Link-Belt[1]
Eastern Gas & Fuel Associates	Koppersten, W. Va.	250	Roberts & Schaefer[1]
	Eccles, W. Va. (2)	80	Fuel Process[19]
Elk River Coal & Lumber Co.	Widen, W. Va.	250	Daniels[20]
Freeman Coal Mining Corp.	Waltonville, Ill. (2)	400	Jeffrey[21]
	Waltonville, Ill.		Roberts & Schaefer[1]
Gibraltar Coal Co.	Central City, Ky. (2)	900	McNally Pittsburg[22]
Gulf Mining Co.	Maben, W. Va.	300	Kanawha[23]
		50	Kanawha[24]
Guyan Eagle Coal Co.	Amherstdale, W. Va.	315	McNally Pittsburg[1]
Harold Fuel Co.	Harold, Ky.	100	McNally Pittsburg[25]
Hackers Creek Coal Co.	Buckhannon, W. Va. (2)	30	Deister Concentrator[1]
High Splint Coal Co.	High Splint, Ky.	400	Jeffrey[21]
Imperial Smokeless Coal Co.	Quinwood, W. Va.	450	Kanawha[27] Jeffrey[27]
Jewell Ridge Coal Corp.	Stollings, W. Va.	80	Heyl & Patterson[28]
Joanne Coal Co.	Rachel, W. Va. (16)	140	Deister Concentrator[1]
Kimberling Collieries Co.	Gilbert, W. Va.	200	Daniels[1]
Leechburg Mining Co.	Leechburg, Pa.	150	Daniels[1]
Lillybrook Coal Co.	Affinity, W. Va.	30	Fuel Process[19]
Lynnville Coal Co.	Lynnville, Ind.	90	Dorr-Oliver[13]
Margaret Ann Coal Co.	Conaway, W. Va.	40	Kanawha[23]
Mid-Continent Coal Corp.	Marissa, Ill.	80	McNally Pittsburg[22]
Nassau Coal Co.	Pageton, W. Va.		Kanawha[23]
New River & Pocahontas Consolidated Coal & Coke Co.	Berwind, W. Va.	100	Roberts & Schaefer[1]
Norfolk & Chesapeake Coal Co.	Logan, W. Va.	150	Kanawha[24]
Northwestern Improvement Co.	Roslyn, Wash.	75	McNally Pittsburg[22]
Old Ben Coal Corp.	W. Frankfort, Ill.	165	McNally Pittsburg[1]
Panther Red Ash Coal Corp.	Oakwood, Va.	100	McNally Pittsburg[29]
Peabody Coal Co.	Freeburg	1,000	McNally Pittsburg[22]
Pecks Run Coal Co.	Buckhannon, W. Va.	180	Prins[30]
Peerless Coal & Coke	Vivian, W. Va.	100	Roberts & Schaefer[1]
Pittsburgh Consolidation Coal Co.	Cleveland, Ohio	150	Fairmont[31]
	Cleveland, Ohio	150	Dorr-Oliver[13]
	Cleveland, Ohio	214	Combustion Engineering[14]

New Bituminous Preparation Facilities in 1955*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Pocahontas Fuel Co., Inc.	Bishop, Va.	20	Link-Belt[35]
	Boissevain, Va.	200	Daniels[3]
	Itmann, W. Va.	40	Roberts & Schaefer[4]
	Jenkinjones, W. Va.	265	Daniels[3]
Pond Creek Pocahontas Co.	Bradshaw, W. Va. (12)	120	Deister Concentrator[37]
	Bradshaw, W. Va.	140	Heyl & Patterson[38]
	Bradshaw, W. Va.	120	Combustion Engineering[39]
Robey Run Coal Co.	Dola, W. Va.	250	Daniels[3]
Roslyn-Cascade Coal Co.	Ronald, Wash.	90	McNally Pittsburg[7]
Slab Fork Coal Co.	Slab Fork, W. Va.		Kanawha[1]
	Alpoca, W. Va.		Kanawha[24]
Sloss-Sheffield Steel & Iron Div.	Maben, Ala.	225	Daniels[40]
			Deister Concentrator[41]
Stahlman Coal Co.	Corsica, Pa.	30	Heyl & Patterson[5]
Stonega Coke & Coal Co.	Pine Branch, Va.	50	Heyl & Patterson[41]
Tasa Coal Co.	Cadiz, Ohio	200	Fuel Process
Uniontown Coal Mining Co.	Uniontown, Ky. (3)	45	Deister Machine[42]
United States Steel Corp.	Corbin, Ky. (21)	180	Deister Concentrator[7]
	Corbin, Ky.	160	Link-Belt[43]
V. & C. Coal Corp.	Charlotte, Ky.	251	Daniels[3]
Valley Camp Coal Co.	Shrewsbury, W. Va.		Kanawha[44]
	Shrewsbury, W. Va.		Kanawha[44]
	Ward, W. Va.	250	Kanawha
Weyanoke Coal & Coke Co.	Arista, W. Va.	300	Daniels[3]
Williams Coal Co.	Mannington, Ky.	15	Deister Machine[42]

* Includes contracts for installations of new preparation equipment in existing structures. Where more than one equipment item was installed, the number, when known, is in parentheses after the plant address.

1. Including DMS dense-media equipment for dual-gravity separation. 2. SuperDuty Diagonal Deck No. 7 tables with Concenco revolving feed distributors as follows: Joanne, 2; U. S. Steel, 3. 3. Including DMS dense-media equipment. 4. Including 6 SuperDuty Diagonal Deck tables, cyclones and Reineveld centrifuge. 5. Water-clarification circuit, including cyclones, filter screen and pumping circuit to pond.

6. Coal-handling system, including 100-ton raw-coal storage and surge bin. 7. Including McNally Tromp heavy-medium equipment. 8. Reineveld centrifuge equipment. 9. Complete preparation plant. 10. Water Clarification and recovery, including cyclone.

11. Reineveld centrifuge equipment. 12. Including 75-ft Dorr thickener and 10-disk American vacuum filter for fine-coal dewatering. 13. Multi-Louvre dryer. 14. Cleaning plant for 3/8x0, including SuperDuty Diagonal Deck tables with 3 Concenco revolving feed distributors, Bird filters and Raymond flash-drying system. 15. Including Wilmot-OCC HM separator equipment.

16. Super-Airflow equipment. 17. Including Jeffrey Baum-type jig equipment, raw-coal and prepared-coal storage, and barge-loading facilities. 18. Crushing and rescreening facilities. 19. Including McNally Rheo fine-coal equipment and McNally Dryclone centrifugal dryers. 20. Reject rewash facilities, including DMS dense-media cleaning equipment.

21. Jeffrey Baum-type jig equipment. 22. Including rotary breaker, McNally Norton washers, centrifugal dewatering equipment, and barge-loading plant. 23. Coal-handling facilities, including 800-ton storage bin. 24. CMI dryer and auxiliaries. 25. Including McNally Norton washer and centrifugal drying equipment.

26. Automatic unit washer, 27. Including Jeffrey Baum-type jig, Reineveld dryer, Heyl & Patterson cyclones and filter screen. 28. Fine-coal plant: 8 Superduty Diagonal Deck tables, Reineveld centrifuge equipment, 8 disk filters and Raymond flash dryer. 29. Belknap chloride washer. 30. Drying plant, Dorrco FluoSolids system.

31. Kanawha-Belknap washer. 32 Middlings rewash, including McNally Norton washer. 33. Fine-coal screening system. 34. Washing plant and auxiliaries, Kanawha-Belknap washer. 35. Automatic fine-coal jig.

36. Prins washer and McNally Brusset pneumatic jig. 37. Dewatering plant for pipelined coal, including two Dorr thickeners, Dorrco Clariflocculator, four vacuum filters and four Raymond flash dryers. 38. Paddle mixer. 39. Fine-coal plant, including SuperDuty Diagonal Deck tables, Concenco Super-Sorter, flotation cells and DMS dense-media washery.

41. Water clarification, handling and recovery, including vacuum filter, cyclones and Reineveld centrifuge. 42. Plat-O coal-washing table equipment. 43. Ground storage, 6,000 tons, including stacking conveyor and reclaiming conveyor to river tipple. 44. Middlings crushing and recirculation to washer. 45. Plant reconstruction to handle both deep and strip coal, including 5,000-ton deep-coal storage, rotary breaker, three McNally Norton washers, McNally Norton automatic rewash jig, crushing equipment, and centrifugal and thermal drying, plus 2,500-ton storages for loading trucks with 1x¼ and 1x0, which also are final sizes for rail loading.

Draglines continued to move a large percentage of the overburden and were favored where a high degree of flexibility in stripping was desirable. Units with up to 10-cu yd capacity and mounted on a single pair of crawlers were popular at smaller operations. Longer dragline booms and more power permitted one operator to dig deeper and mine at depths impossible a few years ago. In an effort to improve digging efficiency, more attention was focused on good bucket design.

Progress continues in truck design. A new 46-ton hauler travels as fast as 40-ton units while carrying 6 tons more payload. More power and efficiency are being packed into turbo-diesel engines which can deliver more horsepower with less fuel. Automatic truck lubrication has paid big dividends at an Ohio operation in lower maintenance costs, lower direct labor costs, longer equipment life and safe operation. (*Coal Age*, August, 1955, p. 60). In addition to these benefits, wastage of lubricants has been cut as much as 43%. Several of the haulage units have operated over 100,000 mi with practically no replacement of those parts of the tractors and trailers lubricated by the automatic system.

Spoil haulage continued on a large scale in the anthracite region where spoil area remains at a premium. As in the past, end-dump trucks and scraper units shared in this work. Scrapers and bulldozers also were teamed with draglines and shovels as auxiliary units to move large volumes of overburden. New power was built into bulldozers, which were made faster and easier to operate and service. The improved models include a twin-engine unit with two 190-hp engines and others powered by diesel engines with turbochargers.

Cleanup work behind stripping units was assigned to bulldozers, motor graders, tractor shovels and combination sweeper and drill units.

The truck and the tractor-trailer remained the workhorses of coal transportation at strip mines. More emphasis was placed on well-graded roads aligned for high speed haulage and with solid, well-maintained roadbeds.

AUGERS: Up Recovery and Boost Efficiency

Highwall augers once more contributed heavily to better coal recovery and better overall efficiency. In some instances augering was carried out on three shifts while preparation facilities operated on a single shift basis. In nearly all operations augers worked 5 days per week, with coal being stockpiled on days the preparation plant was idle. Output per shift varied with the thickness and hardness of the coal and with the depth of augering. In thick coal an average output of 500 to 600 tons per shift was common. In thin coal output was correspondingly less. Maximum penetration was about 200 ft.

AUXILIARIES: Smooth Out the Operation

Auxiliary services were designed to keep machines and men working at top efficiency. As an example of an unusual application of auxiliary equipment, mobile generator sets saved an estimated $15,000 and 24 days in moving a dragline 7 mi in Indiana (*Coal Age*, November, 1955, p. 70).

Life of hoist ropes on big 46-cu yd shovels was boosted fivefold by a



WHEEL EXCAVATOR was an added starter in stripping as operators sought ways to cut costs by moving dirt faster and farther in thicker cover.



LOWER COSTS were made possible with "make-your-own" blasting agent.

co-operative program by engineers, operators and maintenance men in Ohio (*Coal Age*, June, 1955, p. 54). A scientific analysis of rope wear and damage led to a series of corrective measures that overcame the causes of the rope damage. Costly delays resulting from failure of walking pinions on a dragline were eliminated at an Indiana operation by replacing standard units with special heat-treated pinions costing only 10% more but lasting twice as long. At the same mine boom damage caused by the hoist rope was eliminated by a sister-sheave assembly mounted on the boom to control the rope (*Coal Age*, June, 1955, p. 73).

An operator in western Kentucky developed an electric depth-measuring device to provide a reliable method of measuring the thickness of the various layers of rock. This permitted explosives to be used more economically and hole spacing to be changed to meet the varying conditions (*Coal Age*, May, 1955, p. 122).

Preparation

TOTAL CLEANING was emphasized throughout the year in coal preparation, with special emphasis on fine-coal cleaning. Dewatering, drying and filtering was stressed at more and more plants. Heavy-media equipment of various types, and also tables and flotation units marked up gains as operators sought to provide customers with a top-quality product and increase coal recovery. Interest in flocculation increased as a method to speed settling of solids and thereby increase the capacity of settling tanks and thickeners. There was a marked increase in the number of cleaning plants including new or expanded facilities for loading coal into barges for river transportation.

New Anthracite Preparation Facilities in 1955*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Beaver Brook Coal Co.	Beaver Meadows, Pa.	50	Wilmot[1]
Blaschak Mining Co.	Ringtown, Pa. (2)	65	Wilmot[2]
Coates Coal Co.	Centralia, Pa.	100	Wilmot[2]
Colmac Coal Co.	Branchdale, Pa.	65	Wilmot[2]
	Hazleton, Pa.	200	Western Machinery[3]
John G. Connell Coal Co.	Hazleton, Pa.	100	Wilmot[2]
Franklin Hydrotated Coal Co.	Ravine, Pa. (2)	16	Deister Concentrator[4] Wilmot[2]
Jeddo-Highland Coal Co.	Jeddo, Pa. (2)	77	Wilmot[2]
	Jeddo, Pa.	10	Deister Concentrator[4]
Kocher Coal Co.	Valley View, Pa. (4)	32	Deister Concentrator[4]
Live Oak Coal Co.	Minersville, Pa.	100	Wilmot[2]
Minersville Coal Co.	Minersville, Pa. (2)	16	Deister Concentrator[4]
Dennis K. Pickens	Hazleton, Pa.	175	Wilmot[2]
Pine Creek Coal Co.	Spring Glen, Pa.	15	Wilmot[2]
Reilly Contracting Co.	Wiconisco, Pa.	15	Wilmot[2]
Susquehanna Collieries Div.	Glen Lyon, Pa.	100	Wilmot[2]
Tunnel Ridge Coal Co.	Tower City, Pa.	125	Wilmot[2]

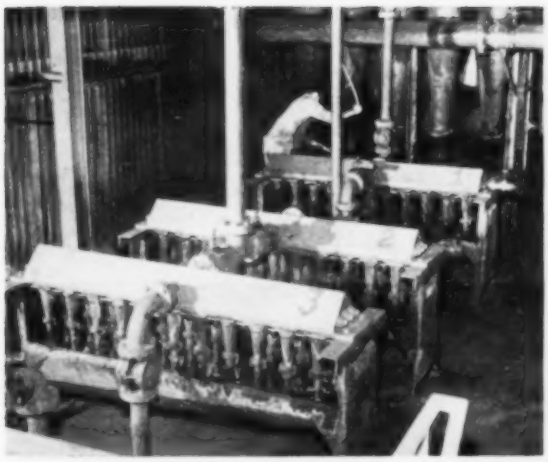
* Includes contracts for installations of new preparation equipment in existing structures. Where more than one equipment item was installed, the number, when known, is in parentheses following the plant address.

1. Wilmot cone-cleaner equipment. 2. Including Wilmot-OCC HM separatory equipment and Wilmot cone cleaner. 3. Wilmot classifier-cleaner equipment. 4. Wemco Mobil Mill equipment. 5. SuperDuty Diagonal Deck No. 7 coal-washing tables.

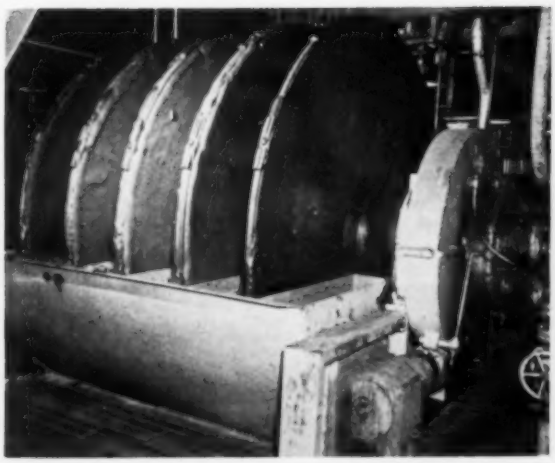
6. Including Wilmot froth classifier and Wilmot cone cleaner. 7. Wilmot-OCC HM separatory equipment. 8. Wilmot jig equipment.

NEW PLANT FEATURES: Twin Flow, Storage and Flexibility

Duplicate circuits were included in a West Virginia plant to reduce down time, provide greater operating flexibility and permit easier maintenance. Other plant features include a 1,200-ton raw-coal storage bin, an automatic density control that assures better cleaning efficiency, and wet raw-coal screening and pumping of ¼ x 0 instead of conveying it (*Coal Age*, November, 1955, p 64). At another new plant, heavy-media facilities with an automatic gravity regulator enables a company to recover areas of a coal seam containing large quantities of near-gravity material. Washing 14 x - 3/16-in coal in one bath, the unit makes a product with less than 5% ash (*Coal Age*, October, 1955, p 63). Simplicity of design was an outstanding feature of another new plant in West Virginia that also included facilities for storing 2,000 tons of raw coal as well as ground storage for 5,000 tons of clean coal and a closed circuit (*Coal Age*, March, 1955, p 70).



CYCLONES gained as thickeners in fine-coal cleaning and in circuits that conserve water and prevent pollution.



FILTERS were included as final step in circuits designed to recover as much coal as possible and boost income.

STORAGE FACILITIES: Improve Plant Operation

Continuity of operation plus smoother plant performance were achieved at more and more plants by both raw and clean coal storage facilities. One new plant in western Kentucky was laid out to include two 5,000-ton raw-coal stockpiles and a 5,000-ton clean-coal stockpile. Bins with capacities of 1,000 to 2,000 tons were common at other plants.

CLEANING FACILITIES: Designed for Maximum Recovery

Variety once more marked the installations of new cleaning facilities in the past year. Coarse-coal facilities included heavy-media, calcium chloride and dense-media equipment, as well as upward-current classifiers and jigs. Wet and dry tables also were installed in greater numbers as more emphasis was placed on total cleaning. Middlings continued to be crushed and recirculated as operators put forth more effort to recover as much coal as possible.

Crushers and rotary breakers teamed with scalping screens made gains where elimination of handpicking was desirable and where large pieces of rock would interfere with cleaning units.

Tables, froth-flotation units and hydroclassifiers marked up gains in the anthracite and bituminous for cleaning fines. Cyclones, thickeners and vacuum filters also were employed to recover coal that would have been pumped to waste in the past.

Mechanical and heat drying continued to move forward in the past year. Mechanical units handled the bulk of the fine coal, usually as the first step before final drying in a heat unit. Heat dryers were used for drying coal up to 1½ or 2 in top size.

New entries in the dewatering and drying field included a centrifugal dryer that combines centrifugal force with vibration to increase capacity and reduce degradation; a radial screen that needs no driving unit for effective thickening ahead of final dewatering; a continuous horizontal vacuum filter; a rotary dewatering machine for dewatering slurries to effect maximum recovery of solids; and a new thermal dryer using the principle of a fluid bed.

Vibrating screens continued to make gains for dewatering and sizing. Stainless steel screen cloth was used more and more for both vibrating and stationary screens, particularly for dewatering service. Crushing units were installed in greater numbers in the clean-coal circuit to provide greater flexibility in loading a wider range of sizes.

Of special significance was the start of work on the cross country pipeline in Ohio for transporting fine coal from the mine to the market. The utility company that will be the line's major customer let a contract for dewatering and drying facilities at the delivery end of the pipeline.

AUXILIARIES: Improve Plant Performance

Auxiliary services were designed to increase plant capacity and efficiency. One Ohio operator applied hydraulic power to operate various gates and valves in the coal circuit, thereby eliminating down time needed to make changes manually and boosting plant capacity correspondingly (*Coal Age*, May, 1955, p 96). Knockdown valves on lines delivering dressing water to wet tables provide more precise control of flow and permit easy removal of foreign particles in the line (*Coal Age*, April, 1955, p 89). Freezeproofing with salt was done automatically at a western Kentucky operation where salt was blown through a pipeline from a warehouse to the railroad car (*Coal Age*, May, 1955, p 124).

A western Pennsylvania operator improved slate disposal with a minimum of capital outlay by building a concrete tunnel and piling slate on top of it instead of erecting a large slate bin. A tripper device was designed to unload the aerial tram car over the center of the tunnel (*Coal Age*, July, 1955, p 62). Plastic suspension boards and drive arms eliminated screen delays resulting from broken boards in an anthracite plant (*Coal Age*, September, 1955, p 67).

Rubber and plastic pipe continued to be used to carry abrasive slurry or corrosive water. Stainless steel remained a favorite for lining chutes and conveyors, and in one instance was used to line a 50-ton raw-coal storage bin to eliminate sticking along the sides. At a West Virginia plant steel sluices were designed for later insertion of ceramic lining.

Plant controls were concentrated more and more in special centers which were kept as free of dust as possible. Dust collection in the plant and from the stacks of thermal dryers received attention at more and more plants. Cyclones and wet scrubbers were favorites for trapping dust on thermal dryers while vacuum systems were used in the plant.



STRONGER EMPHASIS on achieving effective roof control marked 1955, with more of the same in store for 1956.

Safety in 1955

THE RATE OF FATALITIES per million short tons in underground operations was downward again in 1955, from 0.81 fatalities per million tons in 1954 to 0.71 last year. Rates for both years (subject to revision) in surface and strip-mine operations were identical, as shown in the accompanying table provided by the U. S. Bureau of Mines.

In spite of the apparent difficulty of making the big forward strides of some recent years, safety improvement in 1955 still was the center of intense interest and effort among management, mineworkers and public officials. There was a renewed drive on the causes of roof-fall injuries and fatalities and on rooting out of mines and tipples the causes of explosions and fires.

Safety training, especially 100% accident-prevention training, continued without abatement. Regional safety groups promoted significant improvements in some areas, and producing companies continued to make worthwhile incentives of their own pay off.

Notable safety developments in deep mining, strip mining and preparation plants were written into the record, as follows:

UNDERGROUND SAFETY

Better roof control still is the major concern. Falls of roof, face and rib still maim and kill more men than all other causes combined. As 1955 unfolded, expressions of concern were forthcoming from leaders in the industry over the upturn in the rate of fatalities per million man-hr of exposure. A letter to federal inspectors from J. J. Forbes, director, U. S. Bureau of Mines, dated April 1, brought the condition to the attention of the industry. Later in the year, Harry Gandy, safety director, National Coal Association, reported at the October meetings of the Coal Mining Sec. of the National Safety Council that the national campaign against roof-fall accidents had not brought out the expected results.

With these warnings in mind, the industry redoubled its efforts to cut down the roof-fall toll.

Reports from Pennsylvania noted a measure of progress in the fight. Some of this improvement no doubt arises from a decision of the Department of Mines to make an issue of each roof-fall occurrence. Falls resulting in serious injury are investigated in the same manner as those resulting in fatalities, and all others are investigated just as soon as inspectors can get to them. The result is that production per roof-fall fatality in 1955 was about 300,000 tons better than in 1954, meaning the lives of many men had been saved in Pennsylvania.

Other harbingers of improved roof control were seen in the industry's determination to reinforce the national campaign against the hazards of falling material; the still growing acceptance of roof-bolting as a standard of operations; the continuing development of machines and methods for more efficient bolting; and the application of bolting to thinner seams. On the last score, one company refined and expanded its use of 42-in bolts in a 30-in seam, strange as that may sound. The job is done by coring a 9-in hole to a depth of 20 in into the roof, thus making room for the bolt to be inserted.

With improved safety for shuttle-car operators in demand, more companies came up with hard and fast rules against operating cars while not facing in the direction of travel and against operation of the cars by unauthorized persons. Greater track-haulage safety was hoped for as more automatic couplers and automatic loading stations came into use. Locomotive designs, offering greater safety for the operator, also contributed to increased safety in track haulage.

Conversions to longhole methods in pitching seams eliminated the need for men to expose themselves to the hazards of climbing and working on the pitch. A method of probing loaded pillars with an auger to relieve the stresses that might cause bumps was worked out, as described in *Coal Age*, January, 1955, p 68.

Rockdusting received a full share

U. S. Coal-Mine Fatalities in 1955 and 1954*

Cause and Location	Bituminous Fatalities 1955	Bituminous Fatalities 1954	Bituminous Rate[1] 1955	Bituminous Rate[1] 1954	Anthracite Fatalities 1955	Anthracite Fatalities 1954	Anthracite Rate[1] 1955	Anthracite Rate[1] 1954	Total Fatalities 1955	Total Fatalities 1954	Total Rate[1] 1955	Total Rate[1] 1954
Falls of roof and face	192	177	0.41	0.45	34	39	1.36	1.44	226	216	0.46	0.52
Haulage	60	65	0.13	0.17	6	8	0.24	0.30	66	73	0.13	0.17
Explosions: Local	2	2	....[2]	0.01	2	1	0.08	0.04	4	3	0.01	0.01
Major	..	15	....	0.04	..	..	....	....	..	15	....	0.04
Explosives	9	5	0.02	0.01	2	..	0.08	..	11	5	0.02	0.01
Electricity	15	11	0.03	0.03	..	1	....	0.04	15	12	0.03	0.03
Machinery	14	14	0.03	0.04	..	..	....	....	14	14	0.03	0.03
Mine fires	..	1	....	....[2]	..	..	....	....	..	1	....	....[2]
All other	5	..	0.01	....	5	2	0.20	0.07	10	2	0.02	....[2]
Total underground	297	290	0.64	0.74	49	51	1.97	1.88	346	341	0.71	0.81
Surface: Haulage	17	12	0.04	0.03	2	1	0.08	0.04	19	13	0.04	0.03
Electricity	5	1	0.01	....[2]	1	..	0.04	....	6	1	0.01	....[2]
Machinery	5	2	0.01	0.01	..	..	....	....	5	2	0.01	....[2]
All other	6	12	0.01	0.03	5	4	0.20	0.15	11	16	0.02	0.04
Total surface	33	27	0.07	0.07	8	5	0.32	0.18	41	32	0.08	0.08
Stripping: Haulage	5	2	0.01	0.01	..	3	....	0.11	5	5	0.01	0.01
Electricity	..	3	....	0.01	..	..	....	....	..	3	....	0.01
Machinery	8	4	0.02	0.01	2	2	0.08	0.07	10	6	0.02	0.01
All other	7	7	0.02	0.02	1	1	0.04	0.04	8	8	0.02	0.02
Total stripping	20	16	0.04	0.04	3	6	0.12	0.22	23	22	0.05	0.05
Grand total	350	333	0.75	0.85	60	62	2.41	2.29	410	395	0.84	0.94

*All figures are subject to revision. [1]Fatalities per million short tons. [2]Less than 0.005.

of attention. Equipment and methods for applying wet rockdust were worked out, making certain that rockdusting could be kept up to acceptable standards even in back of fast-moving continuous-mining machines (*Coal Age*, January, 1956, p 62). In conveyor transportation, 1955 saw the writing of a USBM schedule on testing conveyor belting for fire resistance and the acceptance of six types of belts under this schedule.

In Indiana, a regional attack on the safety problems common to the shaft mines in the state resulted in a 50% reduction in compensable injuries, as told in the September 1955, issue, p 58. And a company in West Virginia found the practice of awarding green leather work gloves to safe-working crews a worthwhile incentive (*Coal Age*, June, 1955, p 65).

SAFETY ON THE SURFACE

Development of more stable overburden explosives which are insensitive to shock—except that of a special primer—promised greater safety for strip-mine workers. The safety values of good haulage roads, with dust allayed in dry seasons, were recognized at more and more pits.

Electrical safety in the transmission of high-voltage energy was a matter of continuing concern to mine operators. Fool-proof interlocks on field switchhouses, designed to prevent the opening of a switchhouse without first breaking the circuit, came into increasing use during the year 1955.

SAFETY IN THE PLANT

Bearing in mind a number of tipple and cleaning-plant fires that have occurred in recent years, officials in charge of preparation plants came down hard on the problem of dust control. Strict discipline governed the installation and operation of driers, and plant cleanup, either by vacuum collection or washing down, became a standard operating procedure at more plants. Newer plants were designed to permit such cleanups without fouling the equipment.

Welding in the plant was subjected to closer supervision as another way of inhibiting fires. Designers of new plants were giving full attention to providing adequate working room around equipment units and highest possible levels of illumination with the aim of preventing machinery accidents and falls of persons.

AGENDA FOR 1956

As 1955 passed into the record, it was evident more than ever that safety effort can never rest. As coal's safety fraternity faces 1956, it recognizes a responsibility to continue its efforts to combat the longstanding hazards of mining and to prepare counterattacks against new or growing problems, as follows:

Training—The excellent results attained through 100% training in accident prevention pointed up the need for more intensive promotion of the training in areas unreached as yet, and perhaps for the early establishment of a program of refresher training. The Bureau of Mines reports active work on the both.

Shuttle-car safety—More protection for the shuttle-car operator was called for by safety officials in the industry. The engineering committee of Coal Mining Sec. of the National Safety Council is working hard on recommendations to manufacturers setting forth what the industry thinks designers can do in this matter.

Dust cleanup—In recognizing the advances made in rockdusting procedures and in allaying dust at sources of generation, safety leaders in the industry expressed mounting concern over the amount of fine dust left behind in mine openings. Pointing out that it is almost impossible to distribute enough rock dust to neutralize excessive accumulations of fine coal dust, these leaders warned operators of the need for loading out such accumulations as a regular practice.

Better mine lighting—The need for improved lighting in the working section emphasized by the increasing tempo of operations resulting from continuous mining, was brought to the attention of the industry. A producing company, the bureau and a manufacturer (see p 84 of this issue) have already conducted extensive research along these lines and 1956 will see increasing interest in this matter.

1955 Sales of Mining Equipment

By W. H. YOUNG, Chief, Bituminous-Coal and Lignite Section, and R. L. ANDERSON, Supervisory Commodity-Industry Analyst, U. S. Bureau of Mines, Washington, D. C.

SHIPMENTS of mechanical loading equipment for underground use in coal mines in the United States, in terms of capacity, were 22% more in 1955 than in 1954. The capacity of mechanical cleaning equipment sold for use at bituminous-coal mines was 95% more in 1955 than in 1954. Shipments of coal recovery augers, shuttle cars, and "mother" conveyors for use in coal mines in the United States increased in 1955 from 1954, while face-conveyor shipments decreased during the same period.

This survey was made possible by the courteous co-operation of all known manufacturers of mechanical-cleaning equipment for bituminous-coal mines and manufacturers of mechanical-loading and supplementary haulage equipment and coal-recovery augers for use in all coal mines in the United States. Data from various trade journals also were utilized.

Mechanical-loading units, coal recovery augers, and supplementary haulage equipment "Sales in 1955" represent shipments made during the year. Of the total capacity of mechanical cleaning equipment sold in 1955, 35% was placed in operation during that year; the remainder (65%) will be installed later.

Table I—United States Bituminous and Lignite Production by Methods of Mining and Mechanical Cleaning

	1953		1954[1]		1955[1]	
	Thousands of net tons	Percent of total	Thousands of net tons	Percent of total	Thousands of net tons	Percent of total
Hand-loaded underground	71,222	15.6	52,000	13.3	51,000	11.0
Mechanically loaded underground	278,329	60.8	244,000	62.2	300,000	64.5
Mined at auger mines	2,291	.5	3,000	.8	6,000	1.3
Mined by stripping	105,448	23.1	93,000	23.7	108,000	23.2
Total production	457,290	100.0	392,000	100.0	465,000	100.0
Mechanically cleaned	241,759	52.9	224,000	57.1	279,000	60.0

[1]Preliminary.

Table II—Underground Bituminous and Lignite Production, by Methods of Loading

	1953		1954[1]		1955[1]	
	Net tons	Percent of total	Net tons	Percent of total	Net tons	Percent of total
Mobile loading machines:						
Loading direct into mine cars	65,910,130	18.9	...[2]	...[2]	...[2]	...[2]
Loading onto conveyors	10,532,695	3.0	...[2]	...[2]	...[2]	...[2]
Loading into shuttle cars	156,142,324	44.6	...[2]	...[2]	...[2]	...[2]
Continuous mining machines	11,830,097	3.4	...[2]	...[2]	...[2]	...[2]
Scrapers	238,839	.1	...[2]	...[2]	...[2]	...[2]
Conveyors equipped with duckbills or other self-loading heads	8,530,949	2.4	...[2]	...[2]	...[2]	...[2]
Hand-loaded conveyors	25,143,948	7.2	...[2]	...[2]	...[2]	...[2]
Total mechanically loaded	278,328,982	79.6	244,000,000	82.4	300,000,000	85.5
Hand-loaded into mine cars	71,221,990	20.4	52,000,000	17.6	51,000,000	14.5
Total underground production	349,550,972	100.0	296,000,000	100.0	351,000,000	100.0

[1]Preliminary. [2]Included with "Total mechanically loaded."

Table III—Mechanical Loading and Mining Units, Sold for Use in Coal Mines, as Reported by Manufacturers

	1950	1951	1952	1953	1954	1955	Change from 1954 (percent)
Bituminous and lignite							
Mobile loading machines	289	287	206	180	92	120	+ 30.4
Continuous mining machines				67	101	109	+ 7.9
Coal recovery augers	...[1]	...[1]	...[1]	57	55	65	+ 18.2
Scrapers[2]	1	4	8	11	5	...	.....
Shuttle cars	465	524	428	437	242	348	+ 43.8
Conveyors:[3]							
"Mother"	132	114	67	58	19	78	+310.5
Room or transfer	316	297	155	87	61	143	+134.4
Face[4]	116	111	76	49	115	76	- 33.9
Anthracite (Pennsylvania):							
Mobile loading machines	...	...	...	1	17	1	- 94.1
Continuous mining machines	...	...	...	...	1	...	.....
Coal recovery augers	...[1]	...[1]	...[1]	...	...	1	.....
Scrapers[2]	8	8	5	3	...	2	.....
Shuttle cars	...	...	...	...	14	8	- 42.9
Conveyors:[3]							
"Mother"	1	...	...	...	...	3	.....
Room or transfer	57	34	34	16	24	7	- 70.8
Face[4]	...	8	13	2	11	...	.....
Number of manufacturers reporting	20	21	22	25	23	22	.....

[1]Not available. Total number of coal recovery augers sold 1946–52, inclusive, was 271.

[2]Reported as scrapers or scraper haulers and hoists.

[3]Conveyors are classified as to the length the power unit has capacity to take: "Mother", capacity over 500 ft.; room or transfer, capacity 100 ft. to 500 ft.; face, capacity under 100 ft.

[4]Includes "bridge" conveyors.

Mechanical Loading and Mining

Bituminous coal and lignite mechanically loaded in underground mines increased from 244 million tons in 1954 to 300 million tons in 1955 or 23%. Production at strip mines increased from 93 to 108 million tons, or 16%, and auger mine production increased from 3 to 6 million tons during the same period.

Table I shows data on bituminous-coal and lignite production, by methods of mining, and mechanical cleaning for 1953-55, inclusive. The percentage of total output mechanically loaded and mechanically cleaned continues to increase. During 1955, approximately 89% of the total output was mechanically loaded at underground mines, loaded by power shovels at strip mines, or mined by augers along highwalls in strip mines.

Underground production of bituminous coal and lignite, by methods of loading, is shown in Table II. The preliminary figures for 1955 show that 85% of the underground output was loaded mechanically.

Not subject to copyright.

Table IV—Sales of Mechanical Loading Equipment in 1954 and 1955 Compared With Machines in Use in Preceding Years

	Number of machines in use as reported by mine operators						Sales	
	1948	1949	1950	1951	1952	1953	1954	1955
Bituminous and Lignite:								
Mobile loading machines	3,980	4,205	4,318	4,410	4,083	3,985	92	120
Continuous mining machines					152	219	101	109
Scrapers	56	46	39	22	19	29	5	...
Pit-car loaders	37	17	12	...[1]	...[1]	...[1]	...[2]	...[2]
Conveyors equipped with duckbills or other self-loading heads	1,632	1,483	1,329	1,242	1,049	849	...[3]	...[3]
Hand-loaded room conveyors, number of units	4,125	4,312	4,434	3,904	3,569	2,994	61	143
Anthracite mines (Pennsylvania):								
Mobile loading machines	19	27	30	43	54	39	17	1
Continuous mining machines	...	...	...	...	...	...	1	...
Scrapers	643	589	556	528	456	489	...	2
Hand-loaded room conveyors, number of units[4]	3,562	3,618	3,460	3,282	3,232	2,784	24	7

[1]Canvass of pit-car loaders was discontinued in 1951.
[2]Canvass of sales of pit-car loaders discontinued in 1945.
[3]Sales of conveyors equipped with duckbills or other self-loading heads are included with hand-loaded room conveyors.
[4]Includes pit-car loaders and conveyors equipped with duckbills or other self-loading heads.

Table V—Mechanical Loading and Mining Equipment in Use in 1953, with 1954-55 Sales

	Mobile loading machines			Continuous mining machines			Scrapers			Room conveyors[1]			Coal recovery augers		
	In use in	Sales		In use in	Sales		In use in	Sales		In use in	Sales		In use in	Sales	
State	1953	1954	1955	1953	1954	1955	1953	1954	1955	1953	1954	1955	1953	1954	1955
Bituminous and Lignite:															
Alabama	123	12	2	8	2	...	...	...	...	137	1	4	...	1	...
Alaska	3	2	...	...	2	...	10	...	...	3	3	...	...	...	...
Arkansas	...	...	...	...	...	...	...	...	...	64	...	...	...	...	...
Colorado	36	1	...	5	...	...	...	1	...	211	...	...	...	...	1
Illinois	309	1	1	20	6	7	...	...	...	13	...	...	...	...	1
Indiana	107	1	1	...	...	...	...	...	...	...	...	...	...	...	...
Iowa	2	...	...	...	...	...	...	...	...	1	...	...	...	...	...
Kentucky	471	17	27	13	...	6	...	...	...	526	15	28	4	10	11
Maryland	...	...	...	...	...	...	...	...	...	12	1	...	3	...	...
Montana	31	...	...	...	...	...	...	...	...	6	...	...	...	...	...
New Mexico	16	...	...	...	...	...	4	...	...	2	...	...	...	...	...
North Dakota	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ohio	164	...	...	17	1	4	...	...	...	58	1	7	10	12	5
Oklahoma	5	...	...	...	...	...	...	...	...	127	...	...	...	...	...
Pennsylvania	927	5	17	112	38	50	9	2	...	666	...	12	7	9	8
Tennessee	28	...	3	...	...	...	...	...	...	54	...	...	3	...	...
Utah	123	5	3	2	3	5	...	...	...	45	...	...	...	...	...
Virginia	144	11	14	2	2	9	...	...	...	119	10	17	3	1	6
Washington	...	...	...	6	...	1	6	...	...	95	...	...	...	...	...
West Virginia	1,456	37	52	32	47	27	...	...	...	1,496	30	75	64	22	33
Wyoming	36	...	...	2	...	...	...	2	...	208	...	...	...	...	...
Total bituminous coal and lignite	3,985	92	120	219	101	109	29	5	...	3,843	61	143	94	55	65
Anthracite mines (Pennsylvania)	39	17	1	...	1	...	489	...	2	2,784[2]	24	7	...	...	1
Grand total	4,024	109	121	219	102	109	518	5	2	6,627	85	150	94	55	66

[1]Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads.
[2]Includes also pit car loaders.

Auger Mining—The use of augers for coal recovery along highwall in strip mines began about 1945, but separate data on number of augers in use and tons produced by auger mining was first collected for 1952. Auger mining at soft-coal mines in the United States averaged 25 tons per man per day in 1953, compared with 18 at strip mines and 7 at underground mines. Table 24 in Bureau of Mines Mineral Market Summary 2339 shows a comparison of auger mining with other types of mining. A few coal-recovery augers were used in underground bituminous coal mines, and the production from these mines was included with underground mechanically loaded coal. The first coal recovery auger for use at Pennsylvania anthracite mines was shipped in 1955.

Reports received from four manufacturers of coal recovery augers show that 66 augers were shipped in 1955 and all except one was for use along highwalls at strip mines. Table III shows coal recovery auger shipments in 1953, 1954 and 1955, and Table V, the number in use in 1953 and shipments in 1954-55 by states.

Table VI—Units of Conveying Equipment Sold for Use in Coal Mines, 1954-55, by States

State	Face conveyors[1]		Shuttle cars		"Mother" conveyors[2]	
	1954	1955	1954	1955	1954	1955
Bituminous and lignite:						
Alabama	..	2	26	17	..	3
Colorado	..	..	..	2	1	..
Illinois	..	..	1	12	6	1
Indiana	..	..	2	3	2	1
Kentucky	23	24	36	45	..	8
Maryland	1	..	..	..	..	..
Ohio	..	..	..	..	1	7
Pennsylvania	..	14	42	96	3	27
Tennessee	..	..	..	2	..	..
Utah	..	..	8	13	1	2
Virginia	14	2	15	31	..	6
West Virginia	77	34	112	127	5	23
Total Bituminous	115	76	242	348	19	78
Pa. Anthracite	11	..	14	8	..	3
Grand total	126	76	256	356	19	81

[1]Includes "bridge" conveyors and all other conveyors 10 to 100 feet long.
[2]Includes all haulage conveyors with capacity over 500 feet, except main slope conveyors.

Table VII—Bituminous Coal Mechanically Cleaned in 1953 Compared With 1954-55 Sales of Mechanical Cleaning Equipment

State	1953 Number of plants in operation	1953 Net tons of cleaned coal	1953 Output mechanically cleaned (percent)	Annual capacity of equipment sold (net tons)[1] 1954	1955
Alabama	40	11,110,349	88.7	.....	.....[2]
Alaska	1	253,570	29.4	.....[2]	.....
Colorado	5	1,618,150	45.3	.....	.....
Illinois	69	35,456,970	77.1	728,000	2,147,000
Indiana	24	12,650,620	80.0	.....[2]	.....
Kansas	4	1,238,187	72.2	.....	.....
Kentucky	77	28,144,723	43.3	937,000	3,822,000
Missouri	10	2,156,543	90.1	.....	.....
Montana	2	45,035	2.4	.....	.....
New Mexico	1	95,410	18.6	.....	.....
Ohio	25	13,576,190	39.1	.....[2]	.....
Oklahoma	4	623,469	28.8	.....	.....
Pennsylvania	89	48,776,471[3]	52.3	1,738,000	1,052,000
Tennessee	9	535,462	9.8	.....	.....
Utah	6	2,540,571	38.8	.....[2]	.....
Virginia	30	7,372,207	38.6	541,000	1,198,000
Washington	11	671,246	97.3	.....	.....[2]
West Virginia	204	74,893,404[4]	55.8	3,930,000	7,415,000
Undistributed	..	.....	....	537,000	761,000
Total	611	241,758,577	52.9	8,411,000	16,395,000

[1]Based on average days mines were active in 1953 and 7.0 hours per day.
[2]Included in "Undistributed."
[3]Includes some coal mined in Pennsylvania and cleaned in Ohio, and a small tonnage mined in other States and cleaned at a consumer-operated plant in Pennsylvania.
[4]Includes some coal mined in West Virginia and cleaned in Pennsylvania.

Types of units sold—Table III lists the units of mechanical loading and mining equipment shipped for use at all coal mines in the United States, 1950-55, inclusive. Shipments of all types of mechanical loading equipment, except scraper loaders, increased in 1955 from 1954. Shipments of shuttle cars, mother conveyors and room or transfer conveyors increased in 1955 from 1954, but face conveyors decreased during the same period.

Exports of underground mechanical-loading equipment in 1955, in terms of capacity, amounted to 9% of the shipments to mines in the United States compared with 6% in 1954.

Types of mechanical-loading equipment sold compared with units in use—Table IV shows the trend in demand for various types of mechanical-loading equipment. Mobile loading machines in use reached the maximum in 1951 at bituminous-coal and lignite mines and in 1952 at Pennsylvania anthracite mines. However, the 1955 shipments of mobile loading machines were only 3% of the number in use in 1953 at both bituminous-coal and lignite mines and Pennsylvania anthracite mines.

Table V shows the number of mechanical loading units and coal recovery augers shipped to various States in 1954 and 1955 compared with the number in use in 1953, as reported by mine operators. Sales of room conveyors as listed in Table V are not exactly comparable with the number of room conveyors in use. To avoid duplication in tonnage mechanically loaded, the mine operator was instructed to report "hand-loaded" and "self-loading" conveyor tonnage only; therefore, room conveyors loaded by mobile loaders are not included with "Room conveyors in use in 1953." Shipments of coal recovery augers in 1954 and 1955 were greater than the total number in use in 1953.

Haulage Equipment

Shuttle cars—Sales of shuttle cars increased from 256 in 1954 to 356 in 1955. Details of shipments to various states in 1954 and 1955 are given in Table VI. There were 4,222 shuttle cars in use in bituminous-coal and lignite mines in 1953. Details of the number of cable-reel and battery-type shuttle cars in use, by states, 1952-53, inclusive, are given in table 20, Bureau of Mines Mineral Market Summary 2339. Exports of shuttle cars were the same in 1955 as 1954.

Face conveyors—A face conveyor is 10 to 100 feet in length and is used parallel to the face of the room to move material along the face to a room conveyor. Table III lists total sales, 1950-55, inclusive, and Table VI lists sales, by states, for 1954 and 1955. Data on the number in use are not available.

"Mother" conveyors—For the purpose of this study a "mother" conveyor is defined as a sectional, extensible, power-driven conveying unit that can handle over 500 ft of conveyor. Mainslope conveyors are excluded. Table III lists sales for 1950-55, inclusive, and Table VI shows shipments by States in 1954 and 1955. In 1953, 322 bituminous-coal mines used 304 mi of "mother" conveyors. Detailed data by states on "mother" conveyors in use for 1945-53, inclusive, are given in table 21 of Bureau of Mines Mineral Market Summary 2339. Exports of "mother" conveyors decreased 85% in 1955 from 1954.

Mechanical Cleaning

Reports from 19 manufacturers of bituminous-coal-cleaning equipment show that the total capacity of 1955 sales was 12,610 net tons of clean coal per hour compared with 6,230 tons of capacity sold in 1954. However, the annual capacity of 1955 sales, based on average days mines were active in the various States in 1953, showed an increase of 95% over 1954 sales (see Table VII). Sales in 1955, by type of equipment, in terms of capacity, show that dense medium ranked first, followed by jigs, and wet tables in that order.

25 Coal Problems in 1956

Problems perhaps should not be introduced into a summary of growth and progress such as the coal industry, as reported elsewhere in this issue, has experienced in the past year—and will continue to experience in 1956 and the future. But the fact remains that the coal industry still has problems. Some are old, some are relatively new and some still are more threats than problems. Nevertheless, all must be reckoned with, and therefore, as a contribution to better organizing the attack, your commentator this month uses his allotted space to list the major ones.

Competitive

1. Elimination of unfair natural-gas competition.

2. Control of residual-oil importation and dumping.

3. Protection against government subsidization of competitive energy sources. Hydro power was the old governmental favorite. The next might be nuclear power.

4. Lower-cost transportation from mine to market. The coal pipe line is now in the picture, while water transportation continues to accelerate.

5. More and better burning equipment, backed up by an effective distributing organization, for winning and holding domestic, commercial and small industrial users.

6. Harder-hitting coal merchandising reinforced by intensified market research and increased engineering service.

7. Intensified research to develop both new equipment and new uses for coal.

Consumer Relations

8. Development of an advertising and market-promotion program that will reach users and potential users of coal effectively and continuously.

9. Further emphasis on making coal cleaner and more convenient to use, in addition to low ash, sulphur and moisture.

10. Better facilities for handling service problems of the users, including provisions for emergency service on at least a modest scale.

Public Relations

11. Increased facilities for keeping coal's story before the public, thereby cashing in on the more-favorable climate that now exists.

12. More active participation in the elimination and control of air and stream pollution, including an intensified program designed to educate the public in the causes of pollution and the practical remedies.

13. Additional stress on land reclamation and improving the appearance of mining properties.

Government Relations

14. Promotion of the proper understanding and appreciation of coal's importance to the economy in Congressional and governmental circles.

15. Elimination of governmental discrimination against coal in purchases and otherwise.

16. Achievement of the proper degree of protection against imported fuels.

17. Assistance commensurate with assistance to other products in the development of foreign markets for United States coal.

18. Fairness in taxation.

Labor Relations

19. Increased emphasis on the proper sharing of the rewards of progress with employees without strife and work stoppages through better organization for bargaining and promotion of better understanding between men, management and union officials.

Production and Preparation

20. Faster progress in raising tons per man, particularly in the thinner seams, to reach the cost levels necessary for market expansion in the future.

21. Higher efficiency and increased coal recovery in preparation with plants designed for minimum manpower and maintenance.

Safety

22. Real progress in reducing roof-fall injuries and fatalities, supplemented by accelerated progress in eliminating other causes of injuries and fatalities.

Overall

23. Getting a fair price for the industry's product.

24. Strengthening the industry's positions by mergers and joint sales programs.

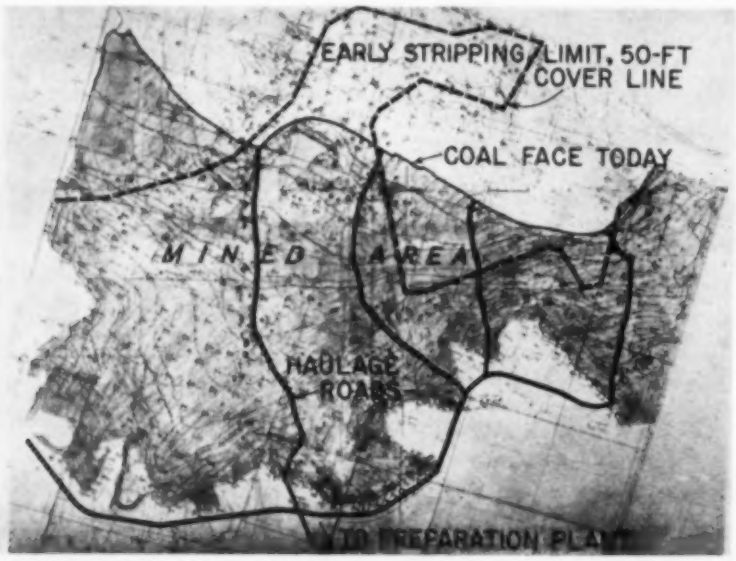
25. Providing capital and manpower for the new mines and facilities that will be required in the near future.



BIG 36-yd shovel works around the clock in banks up to 70 ft high while moving an average of 1,505 cu yd overburden per hour in a pit 65 ft wide. Tractor shovel cleans up loose material missed by shovel.

Revitalizing Program Pays Off

A new 36-yd shovel and high-capacity overburden drill coupled with multiple blasting are paying big dividends at Illinois strip mine.



LONGER LIFE for Delta mine has been made possible by adding larger equipment that works to higher banks. Early stripping limit already has been passed.

BETTER stripping efficiency, improved blasting methods and added mine life are top gains from revitalizing Delta mine of the Delta Collieries, Inc., Marion, Ill. Started in 1952, the program included replacing a 15-yd stripping shovel with a big 36-yd unit and boosting drilling capacity to match the big stripper by adding a high-capacity rotary dry-type unit. The latest step in the rebuilding program is use of a new blasting medium to cut blasting costs and permit multiple blasting.

Delta Collieries was bought by the Ayrshire Collieries Corp. in 1946, several years after the mine was opened by the Sinclair group. Geared to produce 5,000 tpd from the Illinois No. 6 seam, the mine has a remaining life of 25 yr. In the years since Delta mine has been under the wing of Ayrshire, the coal lying under 30 to 50 ft of cover has gradually been depleted. Now overburden averages about 60 ft and sometimes reaches 70 ft. To handle this thicker and tougher material over the remaining coal, the company embarked on the program that revitalized the property. The original 50-ft stripping limit has been wiped out and the company expects to mine all the coal on the property with the new equipment.



HIGH-CAPACITY drilling with this rotary dry-type unit keeps pace with big stripping shovel. Three-man crews work around the clock.



LATEST STEP in revitalizing the Delta mine is use of a new-type blasting agent.

At Delta Collieries

Key men in modernizing and revitalizing Delta mine are James W. Morgan, president; A. M. Campbell, vice president; R. K. Beacham, vice president, operations; W. A. Endicott, general superintendent; and R. H. Swallow, vice president and chief engineer, all of whom have offices in Indianapolis, Ind. Directly in charge of operations at Delta mine is Maurice Williams, superintendent. R. C. Barter is foreman and Elwood Smith is master mechanic. Preparation and quality control are under the direction of J. W. McDivitt, preparation manager who headquarters at Indianapolis.

MINING CONDITIONS

The No. 6 coal averages about 60 in thick at Delta mine. There are no bands of rock in the seam and although pyrite usually is found distributed throughout the bed, there are no large concentrations to interfere with loading. Fireclay underlies the coal and is too soft to support the heavy 32-ton trucks. Haulage roads in the pit therefore are maintained on the top of the coal.

A typical 60-ft section of highwall, beginning at the bottom of the coal, includes the following materials: fireclay; 60 in of coal; 7 ft of limestone; 5 to 20 ft of gray shale; sometimes up to 15 ft of sandstone; and clay and soil to the surface.

EARLY METHODS

A wet rotary drill equipped with a Hughes bit and mounted on a 42 T frame was used to sink 7⅞-in blastholes on a maximum of 26-ft centers. Holes in alternate rows were staggered, thus forming a triangular pattern with holes at the corners of triangles whose sides were 26 ft long. Holes were charged and fired one at a time.

A Marion 5480 shovel, equipped with a 15-yd dipper, worked on top of the coal, while making a 50-ft path through the broken material. This stripping unit worked three shifts uncovering coal for a single-shift loading by a 5-yd Marion 492 shovel.

As the average overburden became thicker, the shovel approached its digging limit and output decreased. To permit the 15-yd unit to work to higher banks and maintain stripping capacity, a 5W Monagan with a 6-yd bucket was added as a booster. Working on the spoil above the shovel, the dragline pulled the material away from the top of the pile, permitting the shovel to continue spoiling at the same level.

Although this equipment team made it possible to work to the higher banks, it became apparent that they couldn't uncover all the coal needed. Efficiency also was decreased as a result of the rehandling.

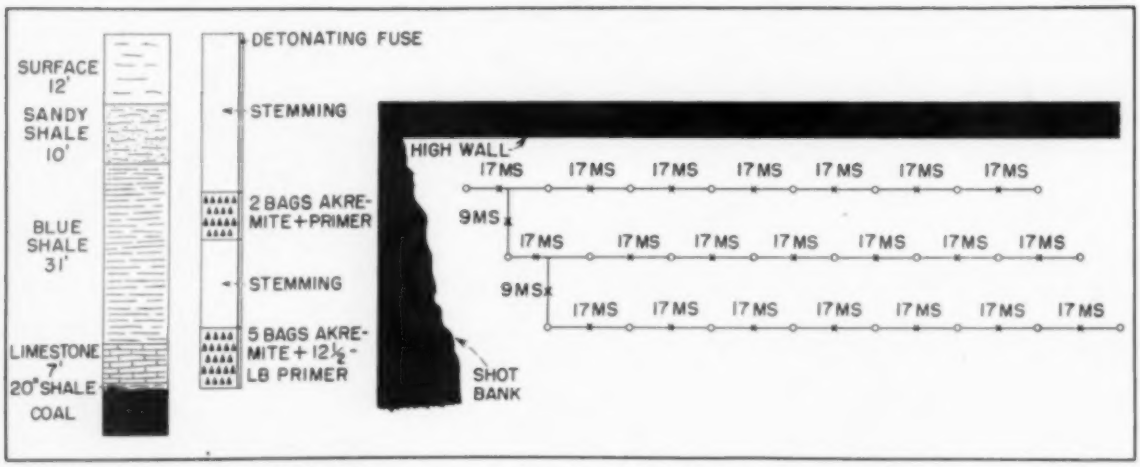
At this point, management decided that a large stripping machine was needed to move the thicker cover that would be met more and more in the future. A 36-yd Bucyrus 1050B shovel was selected as the new stripper.

TODAY'S METHODS

The 36-yd unit took its first bite of overburden in December, 1952. Stripping width was increased to 65 ft and the booster dragline was not needed regularly in the spoil bank.

Experience at Delta shows that under average conditions, the 36-yd shovel works well by itself in banks up to 70 ft high. In some instances up to 82 ft of cover has been moved by the new shovel. The 5W booster also is available to give a hand where the shape of the pit and ground contour does not make it possible for the 36-yd shovel to handle the material efficiently.

About 6 mo after the 1050B shovel was put in service, it became apparent that improvements were needed in drilling and shooting to permit the 36-yd unit to work at top capacity. To break the bottleneck and balance the stripping cycle, a Bucyrus 50-R rotary dry-type overburden drill



HOW DRILLING AND CHARGING are done at Delta mine. Delay blasting reduces vibration and eases digging.



COAL LOADING is assigned to 5-yd electric shovel that picks up 5,000 tons of coal in single shift. Trucks travel on 35-ft coal berm.



COAL HAULERS include seven 32-ton and one 20-ton semi-trailers. Units travel at speeds up to 40 mph on well graded roads with good alignment.

was bought. Fitted with a Hughes bit, the new drill was put to work in October, 1953. Shortly after it went to work, spacing of blastholes was increased from 26 to 30 ft. The same drilling pattern was maintained with the wider spacing.

A significant improvement in fragmentation of the overburden was noted shortly after the new drill was put in service. A combination of smoother and larger holes and use of a larger-diameter blasting agent was believed responsible for the improved results.

The larger 10⅝-in holes continued to be loaded and detonated one at a time. However, deck loading sometimes was needed in the areas with thicker cover or where sandstone was present in the upper section of the overburden. Detonating fuse was used in the full length of the hole where deck loading was necessary to get good fragmentation.

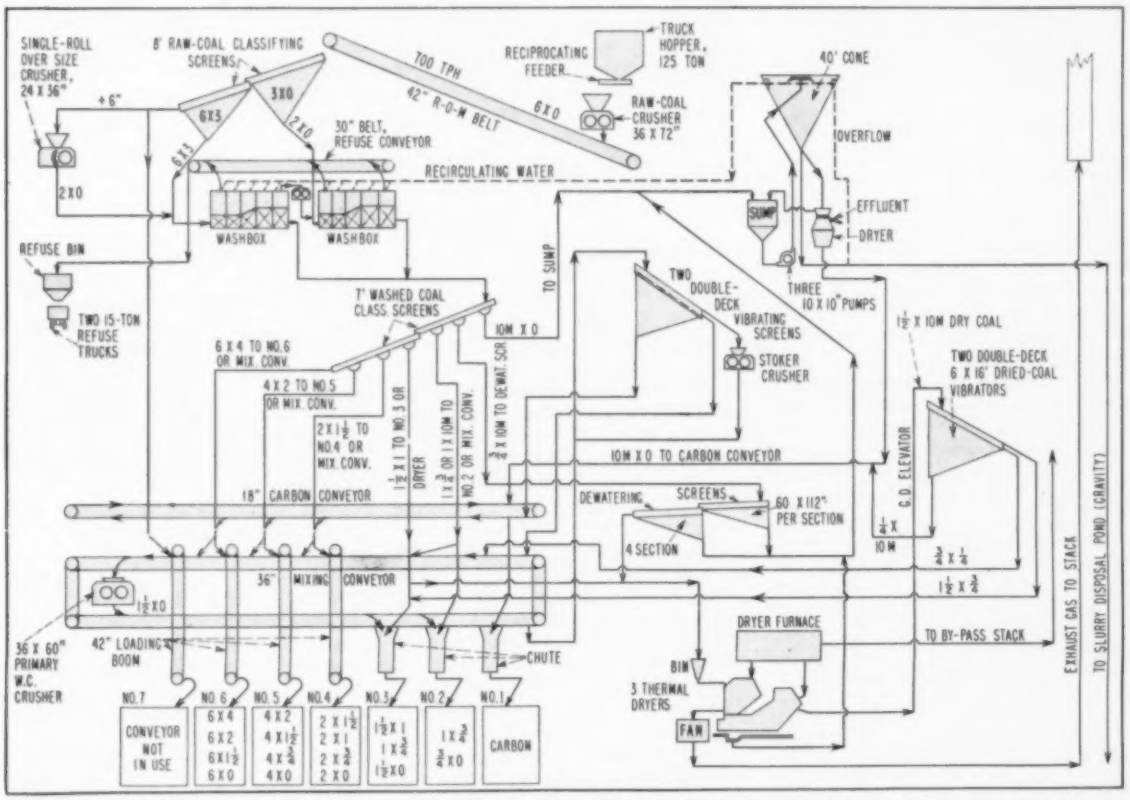
As a result of the improved fragmentation, digging was easier and the 36-yd shovel was able to move more material. The machine now moves 1,505 cu yd per hour in good digging and handles nearly 1,000,000 cu yd per month. A Hough Payloader works in the pit with the stripping unit and scoops up loose rock and scattered material that the shovel misses while digging and drops it where the shovel can pick it up in the normal stripping cycle.

The latest step in revitalizing the Delta mine was taken in August, 1955 when the company started using Akremite to break the overburden. This came about as a result of a search for a more economical method of breaking rock and a material that could be multiple fired.

Akremite is mixed at the mine and



PREPARATION FACILITIES at Delta mine include six-track plant with jig washing, mechanical and thermal drying and flexibility in loading. Close control is maintained over plant performance to produce a uniform product.



HOW COAL FLOWS in the 700-tph Delta preparation plant. Flexibility in sizing, crushing and loading are features.

packaged in polyethylene bags holding 50 lb of the mixture. The blasting agent is delivered to the pit in rubber-tired storage wagons. Each wagon can hold four tons of the blasting agent but usually only 3½ tons are put in. Caterpillar D6 tractors haul the wagons to the drill site.

Three-man crews are assigned drilling and shooting duties on each of the three shifts. An average of 100 ft of blasthole is drilled per hour. Blastholes are loaded as soon as they are completed, but are detonated only on the day shift. Austin AL4 primer and detonating fuse are used to set off the Akremite. The company likes to detonate at least 25 holes at a time.

In a typical 60-ft hole including 7 ft of limestone over the coal, 31 ft of blue shale, 10 ft of sandy shale and 12 ft of surface, Akremite is loaded as follows: Two 50-lb bags are

dropped into the bottom of the hole. Then a 12½-lb primer of Austin AL4 dynamite and detonating fuse is lowered into the hole, followed by three more 50-lb bags of Akremite. Stemming is added to within 35 ft of the top of the hole. One bag of Akremite is dropped on the stemming, then a primer topped by another bag of Akremite. The remainder of the hole is filled with drill cuttings.

A 17-millisecond-delay connector is placed between each hole in the blasting circuit and a 9-millisecond-delay between rows. Management reports that there is no more vibration when shooting 25 or more holes than when with single-hole shooting. The company also feels that there is better movement of the overburden with delay shooting which makes for easier digging.

The 9-in-diameter polyethylene bags of Akremite expand to fill the 10⅝-in drillhole when they are dropped in the hole, giving a concentration of 30 to 32 lb of blasting agent per foot of hole in the section loaded.

LOADING AND HAULING

Coal is hauled to a 125-ton bin at the cleaning plant by a fleet of diesel-powered Euclid semitrailers loaded by a 5-yd Marion electric shovel. There are seven 32-ton units and one 20-ton. Six or seven of the trucks, depending on the length of haul, carry 5,000 tons of coal to the plant on the day shift. The truck not in use is maintained in readiness as a spare.

The main haul road parallels the 2-mi-long pit and lies outside of the stripping area. Four runways through the spoil lead from the main road to the pit. With this layout, trucks take the shortest route to the coal shovel and keep haulage distance to a minimum. Haulage distance to the preparation plant averages between 1½ to 2 mi over any of the alternate routes. Equipped with standard transmissions, the trucks travel at a maximum speed of 40 mph when empty.

Runways are extended into the pit by filling the open cut with fireclay to a level slightly above the top of the coal. This fill is compacted, and then topped with a 6-in layer of 1x⅜-in limestone. A Caterpillar No. 12 road grader scrapes and smoothes the road to maintain a good running surface for the fleet of coal haulers. In dry periods the road surface is sprinkled to allay the dust and eliminate the hazard of poor visibility that would be present with dusty roads.

POWER

Energy is bought from CIPS at 33,000 v and stepped down to 4160 for operating stripping, loading and drilling units. The main power line is made up of 2/0 wires on a pole line located on the highwall and well back from the active stripping area. Overhead lateral lines at right angles to the main line terminate about 600 ft from the highwall. A 500-ft section of high-voltage cable links each of the laterals with a company-designed cable junction unit at the top of the highwall (see Operating Ideas, p 104). Equipped with connections for four separate 4160-v circuits, the unit is designed so that any circuit may be disconnected safely.

PREPARATION

The Delta preparation plant is designed to process 700 tph of raw coal. Features of the plant include two-stage jig washing, mechanical and thermal drying and flexibility in loading.

Coal is removed from the 125-ton hopper by a Link-Belt reciprocating feeder that discharges into a McNally Pittsburg 36x72-in raw-coal crusher. After being broken to 6x0 the coal drops onto a 42-in belt equipped with a Merrick Weightmeter. It is weighed as it is being elevated to the primary raw-coal classifying screen for separation into plus 6-in, 6x3, and 3x0 fractions. The plus 6-in is reduced to 2x0 by a 24x36-in single-roll crusher, mixed with the 6x3 and then carried to a McNally Norton washbox. Refuse is discharged onto a 30-in belt conveyor and discharged to the refuse bin. Middlings are crushed and mixed with the 3x0 from the raw-coal screen in a Link-Belt washbox.

Clean coal from both washboxes is combined and delivered to the washed-coal classifying screen for sizing into six fractions. The 6x4, 4x2 and 2x1½ sizes may be loaded separating on tracks 6, 5 and 4 respectively or sent to a 36x60-in primary washed-coal crusher for reduction to 1½x0 before being loaded on Track 3.

Washed 1½x1 and 1x¾ may be loaded by chute on Tracks 3 and 2 or conveyed to three 50-ton bins feeding three McNally Vissac thermal dryers. The three bins permit flexibility in dryer operation. When the drying load is light 1½x1 and 1x10M are stored in separate bins and dried separately. In this case the third dryer is not operated. If the drying load is around 300 tph, a mixture of sizes is delivered to the bins and all three dryers are operated. Heat for the dryers is supplied by a Detroit spreader stoker with automatic Foxboro controls.

The ¾x10M is dewatered on a four-section screen equipped with Bixby-Zimmer stainless-steel screen cloth before being delivered to railroad cars or to the dryers. Underflow from the four-section dewatering screen is mixed with the 10Mx0 from the washed-coal classifying screen and discharged into a sump. Three 10x10 McNally pumps transfer it to a 40-ft settling cone. Concentrated solids are fed to a CMI centrifugal dryer. The mechanically dried product then is directed to the carbon conveyor which permits it to be loaded separately on Track 1 or mixed with any other size and loaded on any of the remaining five tracks.

Dried 1½x10M is screened into 1½x¾, ¾x¼ and ¼x10M fractions on two double-deck Ripl-Flow vibrators equipped with Tyler ¾-in square and Bixby-Zimmer ⅜-in slotted stainless steel screens. The ¼x10M is mixed with the 10Mx0 product from the centrifugal dryer and delivered to the carbon conveyor.

QUALITY CONTROL

To maintain a daily check on the quality of coal shipped from the Delta mine and provide management with information on plant performance, samples are taken regularly throughout the working shift and analyzed immediately for ash and moisture content. Two technicians take the samples and make the analyses in the company laboratory at the mine. Aside from the daily ash and moisture tests, the men run float-sink tests and use a special sheet to tally detail information on plant operating conditions. Included in the record are details on loading, washer performance, overall plant operation and laboratory results. Information is recorded on the sheet throughout the shift and at the end of the day the completed record is sent to the Indianapolis office where it is checked by the preparation engineer and added to the other daily logs for the plant.

Keeping a close check on plant performance not only gives management details on how the plant is performing but also helps mine personnel keep the plant operating at top efficiency. Management reports that customers seldom question the quality of a shipment.

In addition to the daily tests for moisture and ash, samples are sent to Ayrshire's main laboratory at Danville, Ill., for weekly and monthly proximate analyses along with ash fusion and ash analysis tests. All analysis work is under the direction of J. J. Merle, assistant preparation manager, who supervises a staff of 14 men engaged in laboratory work for six mines.

What to Do . . .

What Not to Do in . . .

Making Suggestion Systems Work

By ERNEST W. FAIR

SUGGESTION SYSTEMS, when properly operated, make a "partner" of every man and woman on the payroll in building the efficiency and profit-making potential of even the smallest firm. Reason? They encourage each and every employee to be constantly thinking and planning of better ways to do his own job no matter what that job may be.

Suggestion systems, as noted, however, must be properly operated. Based on the actual experiences of many firms, here are some ideas that can be used in practical application of a suggestion program which will make every one on the staff an effective "partner" in generating money-saving profit-producing ideas.

Have an established routine. Better results are attained when there is a regular known procedure for submitting suggestions. Experience shows that the written form is preferable to any oral method. Many employees are hesitant to walk into the executive's office with their ideas and often they really have worthwhile ones to suggest. Where only an oral system is available these are lost to the firm.

It has also been found that where such suggestions are presented anonymously greater participation by employees will result. The usual procedure is to provide a number of standard forms by a locked suggestion box at one or more places around the establishment. Each is numbered and each has a duplicate numbered tab. The employee fills in his or her suggestion on the form and retains the duplicate numbered tab. Under this method if the idea is found unacceptable no one knows who suggested it and there is no feeling that the executive may look down on the individual for presenting an unacceptable idea.

The regular routine should also call for a system of considering these ideas. In the small organization the executive himself usually handles such suggestions. However, where possible, a better evaluation of every suggestion can be obtained by a committee of three consisting of the executive or his assistant, an office staff member and some other member of the staff.

After such ideas have been considered and passed on the numbers of those found of interest can be posted and the employee can come forward with his duplicate numbered tab to identify himself.

Collect suggestions frequently. It has been found that where suggestions are left to accumulate in the box for an extended period of time interest will slacken on the part of the employees. There is also the possibility that someone may suggest a very good idea which requires immediate application to be effective. The usual procedure is to collect two or three times a week.

Carefully analyze each suggestion. In addition to such analysis, see to it that employees know that this is being done. "Goofy idea . . . wouldn't work," is a snap judgment method that not only can wreck the whole system but result in overlooking an idea that later proves very worthwhile.

All employees should know what is being done in making such study and analysis of their ideas. Where a program has built up to very active participation by employees a weekly report posted on a small bulletin board by the suggestion box will greatly increase employee interest.

Make sure that awards reflect value. Every effort should be exerted to be certain that the awards are fair and commensurate with the actual value of the idea to the company. Various firms use cash, government bonds, company stock and merchandise as awards. Most successful systems are those based on actual cash. The current trend is to have a minimum award of $2, $3 or $5 with no maximum limit. Most plans provide for payment for each adopted suggestion on a basis of its value to the company. When the savings brought about by the suggestion can be determined, it is the usual practice for the employee to be given 10% of the gross savings during the first year his idea is used.

It has also been found that an occasional large reward, where it is justified, increases the interest of every man and woman on the staff in the program. Even though small sums are usual the very fact that one large one has been made keeps their interest at a high level.

Handle suggestions properly. Proper handling is of vital importance and management should always make sure that every action of those passing on them is understandable, reasonable and logical from the viewpoint of both the employee and the company. Taking the trouble to explain exactly why each idea was accepted or rejected in the form of a periodic bulletin will do a great deal toward maintaining interest in the whole suggestion program. It is just as important as posting and publicizing actual cash awards.

Announce the winners. Everyone wants to know the winners' names and the amounts. In small organizations there is a tendency to tell only the individual to whom the award is given. In many such instances he or she never bothers to pass along what has been done and other employees are not even aware that such an award has been made.

The fact that awards, no matter how small, are actually being made, is a spur to increased interest by every other member of the staff. Winners' names and their awards should be posted on a bulletin board and left there for a sufficient length of time to make sure everyone knows.

Let everyone participate. It is difficult to guess where a good idea will originate. Firms which limited participation to a certain phase of the business soon found that they were receiving no ideas from others. In those organizations where every employee on the payroll is free to suggest ideas which can be used in each and every department, it is found that their detached viewpoint often brings up something that would never occur to the man or woman right on the job.

It has also been found that such suggestions generally embrace ideas that cover phases of the problem not only in one department but affect other sections of the business and therefore are much more valuable as well as being easier to analyze and adapt to immediate use.

The firm without a suggestion program is depriving itself of many "partners" who can contribute to its more profitable operation with a minimum financial outlay and no interference with management.



FIG. 1—32-V LOCOMOTIVE HEADLIGHT LAMPS, in series, 30-ft spacing.

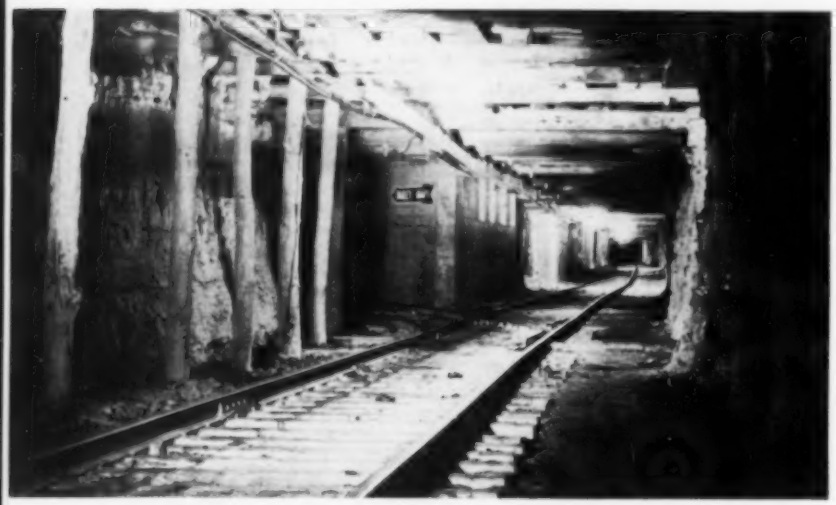


FIG. 2—50-W 220-V LAMPS in groups of three, 70 to 90 ft between groups.

Incandescent Haulage Lighting



FIG. 3—GROUPS MOUNTED ON RIB for uniformity and minimum glare.

Better

What its benefits are
What conditions must be met
What some experimental installations show

The Frick Experiments

By ROBERT R. GODARD
Electrical Engineer, Frick Dist., Central Operations — Coal, United States Steel Corp., Uniontown, Pa.

BETTER LIGHTING UNDERGROUND has long been recognized as highly desirable from both the safety and efficiency standpoints. In spite of this general feeling however, only a few coal operators have actively participated in lighting development projects prior to the relatively recent publication of the results of tests sponsored by Bituminous Coal Research, Inc., and others.

Appreciating the basic advantages, the United States Steel Corp. has set up additional underground illumination as a prime goal with the aim of promoting safety and, we sincerely believe, increasing production.

To this end, several experimental lighting projects have been installed in our district mines in an effort to determine the types of installations best suited to our purpose. Several of the Frick District projects will be described in the following material.

LIGHTING GOALS

In planning any underground illumination system, whether for haulage roads or producing sections, consideration must be given to the following:

1. Level of illumination or intensity.
2. Uniformity of distribution of light.
3. Absence of glare.
4. Initial cost.
5. Maintenance cost.

Abstracted from a paper presented at the meeting of the Coal Mining Institute of America, Dec. 15, 1955.

Mine Lighting

The weight attached to each of these factors must be determined by the application. Speaking of intensity, for example, main haulage lighting requires a relatively low level of illumination, possibly ½ foot-candle, with extreme uniformity and complete absence of glare. If these conditions are not met, locomotive motormen will be blinded by glare or erratic distribution of light and a safety hazard will be created.

Lighting requirements for working sections, on the other hand, are varied. A comparatively high level of glareless illumination, 5 to 20 foot-candles, is desirable for face lighting, loading stations or other areas of high activity. Shuttle-car haulage roads benefit from 2 to 4 average foot-candles of illumination. One to two foot-candles of uniform light will usually suffice for belt-conveyor systems, except at transfer points where 3 to 5 foot-candles are needed.

These levels of illumination are seemingly far below today's industrial standards for lighting. However, it must be remembered that the intensity of illumination required for man to perform any task with ease is largely dependent upon the complexity of that task. There is no doubt that as mining machines become more efficient and probably more complicated, the light intensities needed will increase and may more closely approach industrial standards.

Haulage Lighting

In the interest of low initial cost, the haulage lighting systems to be described in the following material have been designed for operation on 550-v DC, the standard mining voltage in the Frick District.

The haulage illumination system installed in portions of Leisenring No. 2 mine is shown in Fig. 1. It consists of groups of 20 32-v 150-w locomotive headlight lamps in series, with a spacing of 30 ft between lamps. Each series string is protected by a safety switch and 6-amp fuse.

Light intensity averages 1 foot-candle on a plane 4 ft above the track. Labor and material cost for each group of 20 lamps is estimated at $120. This is equivalent to 20c per foot of illuminated haulage.

While usable as an illumination system, this installation has several drawbacks. They are:

1. Glare produced by moderately high intensity point sources borders on the undesirable.

2. Inductance of each string is sufficient to make circuit interruption by low-cost safety switches less than 100% reliable.

A somewhat different arrangement was tried on 6 Flat Left, 3 Main Butt, Robena mine (Fig. 2). Groups of three 50-w 220-v lamps in series are mounted in the center of the haulage and connected from trolley to rail. Spacing between groups varies from 70 to 90 ft and produces an average intensity of less than 1 foot-candle. No fuses or switches were included since it was felt that the lamp filaments would provide their own short-circuit protection.

Initial cost is approximately $6 per cluster of three lamps or 7c per foot of haulage.

The system installed along the empty track behind Colvin Shaft, Robena mine (Fig. 3) is similar to the 6 Flat installation, except that the clusters of lamps have been mounted against the rib. Average light intensity is only slightly less than for the installation shown in Fig. 2, yet the installation cost is identical.

Of the three haulage lighting installations described, this appears to be most desirable. It combines reasonable uniformity of illumination and absence of glare with low cost.

Section Lighting

Section lighting fixtures, to be usable under any and all conditions of ventilation in gaseous mines, must have a U. S. Bureau of Mines permissible plate.

The problem of eliminating any chance of gas ignition by hot filaments following breakage of the larger sizes of incandescent lamps is great. Thus, permissible fixtures for such lamps must be explosionproof in construction. In this form, their size and weight make them generally unsuited for portable service in working sections.

Through tests conducted by personnel at the U. S. Bureau of Mines Central Experiment Station in Pittsburgh it has been established that fluorescent lights with instant-start circuits are intrinsically safe. That is, an energized tube may be broken in an explosive mixture of methane and oxygen with no gas ignition resulting. This fact will make possible the design of relatively light weight readily portable permissible fixtures for section lighting.

AC OR DC?

AC v. DC operation of fluorescent fixtures in an established mine equipped for DC distribution only is often a matter for thought. While it is well known that AC operation offers the advantages of much greater lamp efficiency, increased lamp life and increased safety, it must be borne in mind that the cost of a separate and extensive underground AC distribution system for lighting only is rather high. Alternate methods of obtaining AC power include the use of small motor-generator sets or static frequency inverters employing grid-controlled mercury-vapor tubes operated from the DC trolley.

Experiments were conducted using a modified early model Mine Safety Appliances Co. fluorescent fixture to determine the practicability of 550-v DC operation of such devices. This fixture contained two 14-w fluorescent tubes and a 1,000-ohm ballast resistor, all in series. Lamp current was limited to the normal value of 0.4 amp. Operation of the tubes was satisfactory. Light output was normal and only a small amount of blackening was observed at the tube ends due to metallic deposit resulting from unidirectional current flow. However, the energy loss in the ballast resistor was prohibitive both from the standpoint of cost and heat dissipation in the fixture. A reduction of this loss by approximately 50% was obtained by increasing the resistor to 3,000 ohms. This permitted a lamp current of roughly 0.18 amp to flow, but yielded a light output only 60% of normal.

With the present rapidly moving trend among the more progressive coal operators toward the use of AC operated face equipment, it is believed that this problem will cease to exist within very few years through widespread appearance of underground AC distribution systems for mining machinery.

FLUORESCENT FIXTURES

Pending release of Bureau of Mines proposed Schedule 29, covering examination of underground lighting fixtures, permissible units of the fluorescent type are not yet commercially available.

The fluorescent fixture shown in Fig. 5 was developed by Mine Safety Appliances Co. for underground use. This unit utilizes two 14-w T12 fluorescent tubes and is designed for operation on 117 v, 60 cycles.

Physically, the fixture is 16½ in long by 5½ in in diameter and weighs



FIG. 4—HEADING INSTALLATION, 15-ft spacing.

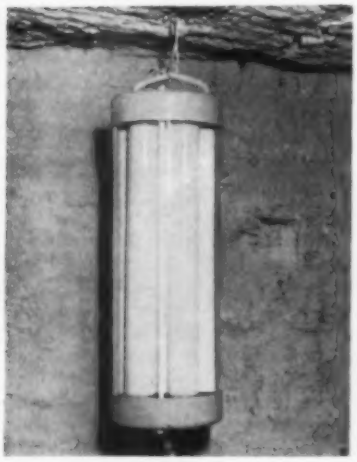


FIG. 5—EXPERIMENTAL fixture.



FIG. 6—DRIVING CROSSCUT, 15-ft fixture spacing, 3 foot-candles.

Fluorescent Face Lighting

approximately 17 lb. When equipped with suitable plugs and connectors, not shown, it is believed that this unit will meet all requirements of the proposed schedule.

Twenty of these MSA experimental fixtures were installed in a 12-ft-wide by 7½-ft-high heading in Robena mine (Fig. 4). Spacing between fixtures is 15 ft. Ribs and roof were well treated with rock dust with a moderately high reflection factor. Light intensities down the middle of the heading vary from 2 to 5 foot-candles. Average intensity is 3 foot-candles.

Accurate cost data for this installation are not available since the fixtures used have not yet been put into commercial production.

Application of the same experimental fixtures to face lighting is shown in Figs. 6 and 7. A continuous mining machine followed by a shuttle car is shown starting to turn a crosscut from the heading shown in Fig. 4. A 15-ft fixture spacing was retained with approximately 3 foot-candles average intensity.

Fig. 7 is the same operation shown in Fig. 6 but viewed from the front of the continuous miner. It is significant that the light fixtures were designed for area illumination and not for the higher levels of intensity desirable for face lighting. Yet by adding only a few foot-candles of light, there is a striking improvement in face illumination over that found in coal mines today.

This article has touched briefly but a few of the many aspects of the field of underground lighting. It is hoped that other operators and manufacturers will participate in the development necessary to produce better mine lighting systems in the interest of improved safety and efficiency in the mining industry.

I would like to acknowledge the cooperation of the Mine Safety Appliances Co. in supplying experimental fixtures for some of the tests described in this article.



FIG. 7—SHOWING AREA ILLUMINATION with miner starting crosscut.

Safety and Operating Advantages

By J. A. BOYLE
Chief Mine Inspector, Coal Operating Div., United States Steel Corp., Uniontown, Pa.

OUR PROGRAM OF SAFETY in and about our coal mines has encompassed many and varied approaches to the problem. I believe I can say with complete honesty that we have used all conventional methods known and practiced throughout the industry, and many others that I believe have been pioneered within our organization. With the exception of one isolated instance, however, illumination as an approach to improve safety underground is still largely unexplored. This is not to say that the lighting of our coal mines is substandard compared to the rest of the industry. You would find the converse to be true. To date, however, our progress in underground illumination has been, to the greatest degree, a function of the progress of the industry as a whole together with associated and interested manufacturers . . .

The invention of the electric cap lamp was unquestionably one of the great forward steps in the coal-mining industry because it offered the miner the opportunity of doing his work with a far greater degree of security and comfort than ever before.

The electric cap lamp has been modified and improved from time to time, but despite these improvements and the mounting of lights on face equipment, underground illumination has not kept pace with the advancements in the design of modern mining equipment and the improved techniques in coal extraction.

Recognizing this fact, the management of the Coal Div. of the United States Steel Corp. has set out to see what can be done to remedy this situation. We have prevailed upon the personnel of the U. S. Bureau of Mines to formulate a schedule of permissibility for face-lighting equipment, giving manufacturers the opportunity to develop a method of illuminating face areas with fluorescent lights. An expanded program of research work aimed at better haulage lighting has been started.

GOOD LIGHT CUTS INJURIES

Pursuing this course to its ultimate conclusion will result in giving coal miners the advantage of the best-possible illumination underground, which in turn should give us equal opportunity to become competitive accident-wise with the best of other industries. I base this statement on the fact that our accident experience in the working spaces underground where we have been able to provide adequate illumination compares favorably with that in our outside shops. For example, I cite the motor barn in Robena mine where all the maintenance work on the locomotives for a 24,000-ton operation is performed. No lost-time accident has been experienced in this motor barn in the past 10 yr . . .

In summation I believe it can be safely stated that the improvements in mining equipment and in the methods employed in ventilation, roof control, dust control and drainage have brought the coal-mining industry nearer to other industries in developing standard working conditions. It would follow that with improved illumination the final obstacle would be surmounted. As a result, the improvement in working conditions and the better housekeeping that would certainly follow would definitely contribute to an improved performance safetywise as well as productionwise underground.

It is not beyond the scope of my imagination to visualize mechanical sections lighted from the loading points to the working faces in addition to the general lighting of haulage roads. It is my thought that improved illumination underground warrants the complete support of responsible coal-mining companies, in addition to that of manufacturers and interested governmental agencies. The undivided support of this endeavor will be rewarded in higher work standards and an improved accident-frequency rate, both of which should finally be reflected in improved economic performance by the coal industry of the nation.

Excerpted from a paper presented at the meeting of the Coal Mining Institute of America, Dec. 15, 1955.

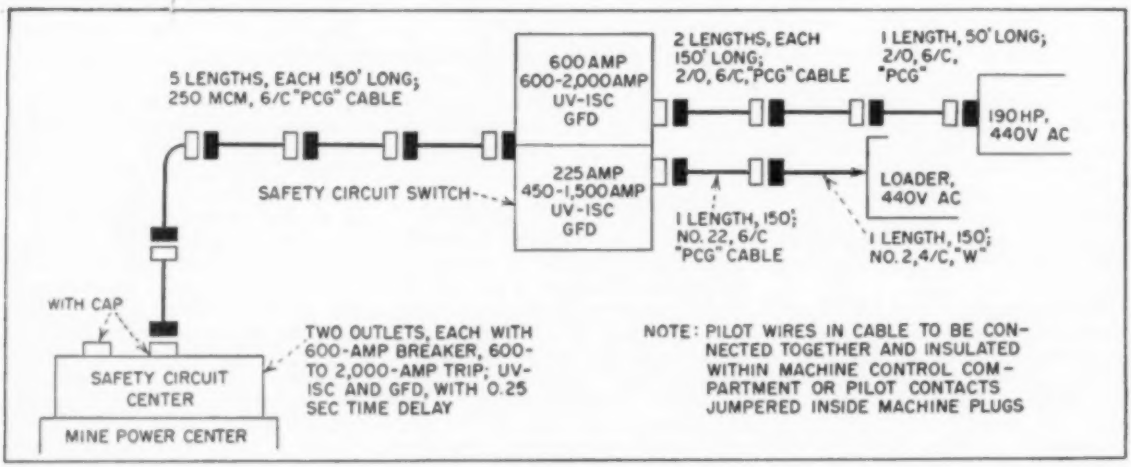


MINER is teamed with loader to mine areas with tender roof where other equipment cannot be used efficiently.

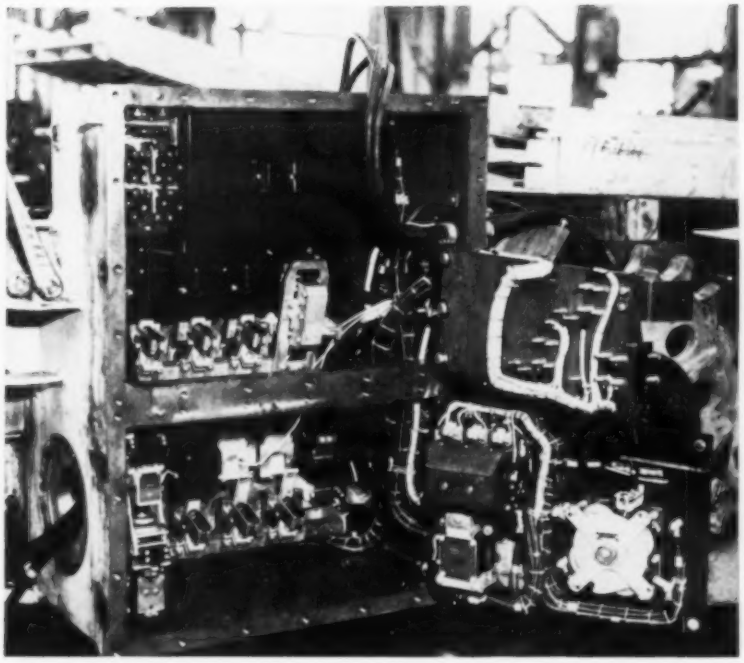
How Enoco Uses AC Power For

Electrical maintenance is at a minimum on AC machines after 23 months of operation. Power distribution is simplified. Roof-control problems are reduced and pillars are recovered successfully.

APPLICATION OF AC POWER, which has been in use for other mining operations for some time, has been extended to continuous miners at the Enoco Collieries, Inc., Bruceville, Ind. After 23 mo of operation with 440-v AC Colmols, electrical maintenance



HOW AC POWER is distributed underground at Enoco. Safety and ease of handling are outstanding features.



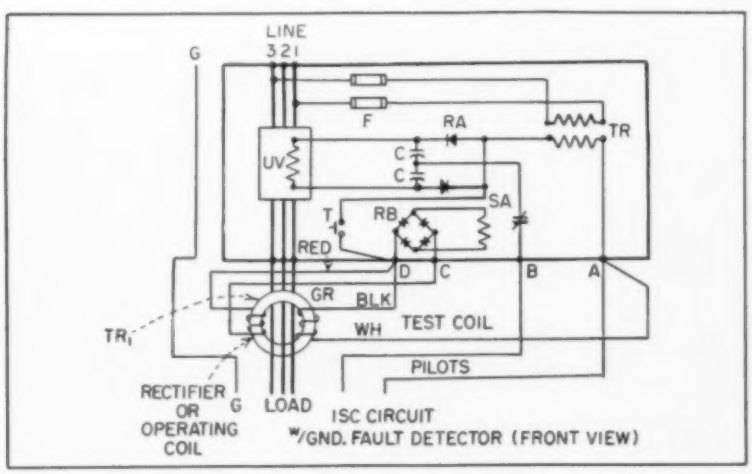
CONTROL BOX and panel for AC continuous miner features simplicity of design.

Continuous Miners

has been virtually nonexistant and the only electrical preventive maintenance needed is periodic inspection of controllers. Rounding out the benefits from AC continuous mining are reduction of roof-control problems in continuous mining areas and successful pillar extraction in areas that could not be mined efficiently with conventional units.

Since AC underground equipment had been used at Enoco in the past, it was logical that the continuous miners also should be AC units. Up to the time they were put into service Enoco's equipment was all 220 v. However, because of the heavier power demands that would be made by the new continuous miners, management selected 440-v power.

At the time the continuous miners were purchased, Indiana mining laws prohibited underground voltages for face equipment higher than 275. With the help of the U. S. Bureau of Mines, Indiana Department of Mines and the safety division of the UMWA, a program was worked out to permit use of 440-v face equipment. The Indiana mining law also has been revised to permit face voltages up to 650.



AC CONTROL CIRCUIT has ground-fault detector that provides protection.

AC STUDIED

To reassure themselves before making a final decision on the AC continuous miners, Enoco management men made a thorough study of AC and DC power to compare them on the following points: initial cost of equipment; cost and ease of handling cable; efficiency; and electrical hazards.

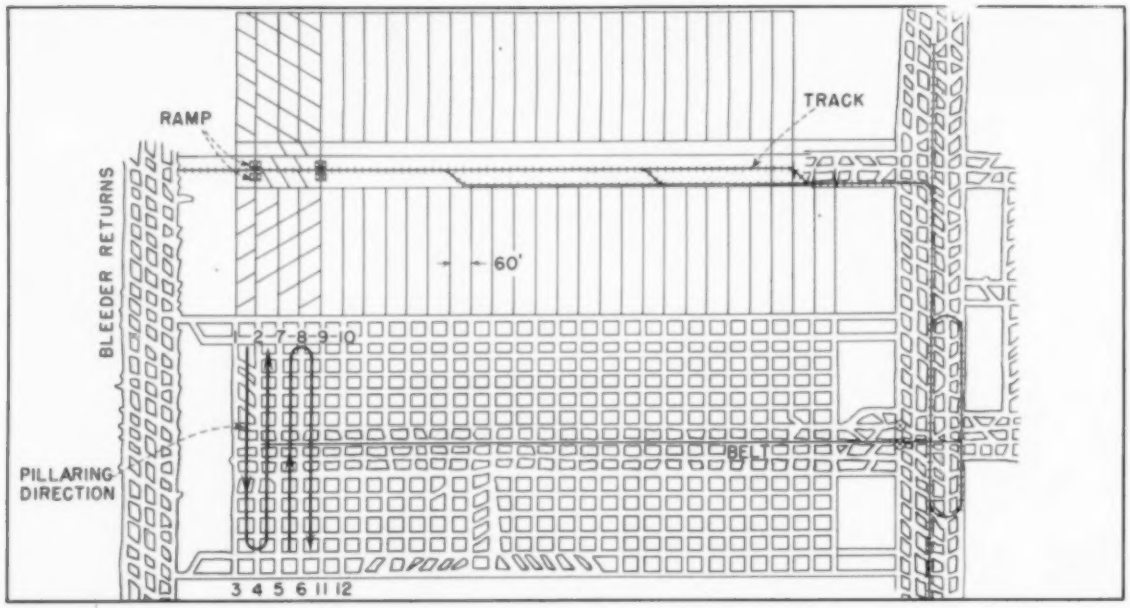
Results of the study showed that the first cost of AC equipment on a Colmol was 9.8% less than on a DC unit, and that the cost of a 300-kva transformer was 69% less than a 300-kw rectifier. Since higher voltage could be transmitted by smaller wires, cable cost was lower by more than 50%. A cable one-half the size and weight of that needed for a DC machine was ample for the AC unit. Aside from the lower cost, the AC cables could be handled more easily underground.

The problem of maintaining good face voltage also was simplified with AC equipment since portable transformers could be easily and quickly moved and reset in new locations. Recent design trends are said to favor constant speed motors for driving hydraulic equipment in the Colmol. Thus an AC induction motor can be used effectively for that job.

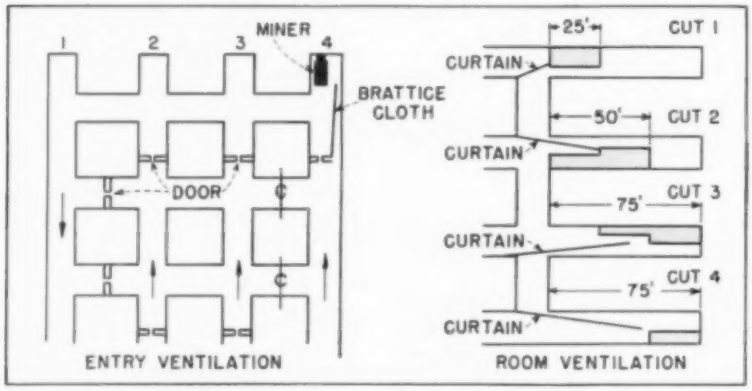
Training of maintenance men is greatly simplified with AC equipment. Enoco's past experience with AC power proved that men could be easily trained to repair and maintain AC equipment. Greater protection against electrical hazards also is provided by the AC equipment. The circuit is completely insulated and with the proper protective devices there is little hazard from shock, gas ignition or fire.

POWER DISTRIBUTION

Primary AC power is delivered to the mine at 2,400 v through boreholes as near the working section as possible. A magnetic circuit breaker is



MINING PLANS for continuous mining now include track gathering haulage. Rooms are mined in sequence shown by numbers and pillars are extracted in direction shown by arrows. Bleeders are left around all caved areas.



VENTILATION PRACTICE is designed to provide maximum quantity of air at highest velocity and with a minimum of interruptions in the flow of air.

installed at the bottom of each borehole to provide protection on the incoming side of the circuit.

Enoco has used both steel-armored lead-sheathed and neoprene Type G shielded cables to transmit underground power. Both are 5,000-v 4/0 3-conductor Hazard types. Management reports that the neoprene cable has proven to be the most satisfactory for underground installation at Enoco.

At regular intervals the cable is sectionalized with oil disconnect switches equipped with series trip coils. Disconnect switches also are installed at the entrance of each section and at each transformer station. The primary



PILLAR FALLS are good in continuous mining sections. Extraction is simplified and roof problems are few.



HAULAGE equipment includes shuttle cars and steel mine cars. Loading ramps are installed on both sides of track.

line is connected to the section transformer with a 5,000-v plug-type connector.

DRY-TYPE TRANSFORMERS

Primary power is stepped down to 440 v by 300-kva dry-type nitrogen-filled Westinghouse transformers. These units are reported to be the first 300-kva dry-type units used underground. The primary connection is 2,400 v delta and the secondary is 480 v wye. There is also a 5% tap below 2,400 v. Weighing only 7,000 lb, the unit is 3 ft high, 5 ft wide and 10 ft long, and is skid mounted for easy moving. Since there is no cooling liquid to add to bulk and weight, the transformers can be moved with a minimum of effort.

Enoco management points out that the safety features of this unit are superior to those on DC conversion equipment. A minimum of maintenance is needed since the transformers are hermetically sealed against dust, dampness and explosive gases.

Attached to the low-voltage side of the transformer is a safety circuit center with two outlets. Each outlet has a 600-amp circuit breaker with 600- to 2,000-amp trip, ground-fault detector and an under-voltage intrinsically safe control with a ¼-sec delay.

SECONDARY TRANSMISSION

The secondary 440-v line carrying power to the AC mining equipment is made up of 150-ft lengths of 250,000-cir mil 6/c PCG cable fitted with Joy permissible attachable connectors. The cable includes full-size power conductors, a half-size ground and two No. 10 pilot wires. The plugs and receptacles have contacts for each. Connectors are designed so that the pilot contacts join after and break before the power contacts. This permits the control devices to operate before the power circuit is interrupted or made.

A permissible junction box with two outlets is provided for each working section. One outlet includes a 600-amp circuit breaker with a 600- to 2,000-amp trip, the other has a 225-amp circuit breaker with a 450- to 1,500-amp trip. Both have undervoltage intrinsically safe controls and ground-fault detectors. Power for the Colmol is transmitted through the larger breaker and for the pickup loader through the smaller unit.

TRAILING CABLE

Cable from the junction box to the Colmol is 2/0 6/C Type PCG and is sectionalized into two 150-ft lengths and one 50-ft section next to the machine. Ends of each section are fitted with permissible attachable connectors and the cable also is attached to the Colmol with a permissible plug and receptacle. Hence it is possible to change a cable section quickly and without removing the controller cover at the cable entrance. The circuit breaker in the Colmol circuit has a relay that insures proper phasing of the cables.

An important feature of the AC controller for the Colmol is simplicity. Each motor is started with a simple 3-pole magnetic line starter.

AC ADVANTAGES

Because of the portability of the AC power equipment and the ease of adding or removing sections of cable, Enoco has always had good face voltage. The company points out that with the same size conductor, power can be transmitted four times as far at 440 v as it can at 220 with the same voltage drop.

Since the company has become experienced in using sectionalized cable there has been no trouble with it. Cable design, including the intrinsically safe control, makes it possible for anyone to add or remove cable safely and efficiently. Therefore face equipment can operate with a minimum of cable at all times. A damaged section of cable can be readily removed and replaced in less time than would be needed to make a temporary splice. Cables also are easy to handle because they are lighter than 220-v conductors.

In the period since the 440-v Colmols have been in service there has been no excessive cable heating or damage to the insulation. The original cables are still in service.

To date the electrical repairs on the three Colmols have been at a minimum. One 600-amp circuit breaker was replaced when a terminal was destroyed as a result of a faulty connection on the trailing cable. The only motor trouble was caused by a defective fan which created a ground fault between the rotor and stator winding. Protective devices limited damage to a minor break in the insulation in the stator winding.

Another outstanding feature of the AC equipment is the elimination of motor inspections. Periodic inspection of the controllers is the only preventive maintenance required.

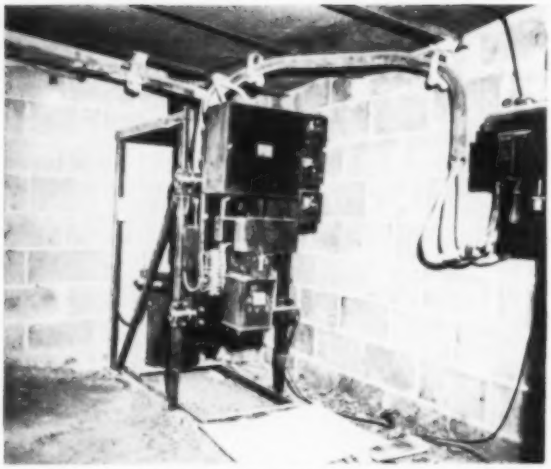
MINING METHODS

The continuous miner units are working in the southwest section of the mine where the immediate roof is soft gray shale. It is extremely difficult to support this roof with conventional timbers in conventional mining. However, soon after the continuous miners were installed in the area there was a definite improvement in roof conditions. Roof-bolting also has been helpful in improving roof control.

In entry development, the continuous miner advances four headings on 45-ft centers. The intake heading is driven 18 to 20 ft wide to provide enough area for good ventilation. Two lifts are needed to provide the full width. After the machine bores a maximum of 25 ft on one side it moves back and advances 50 ft on the other side. The first 25 ft is supported by props or steel roof jacks set on 5- to 6-ft centers. When the 50-ft advance is completed, the Colmol is trammed to the next heading. As soon as the miner leaves the place, 4-ft expansion-type roof bolts are installed on 4-ft centers with a Fletcher bolting ma-



FASTER and easier bit changes plus longer bit life are top benefits from bits securely wedged into holder on boring-type continuous miner.

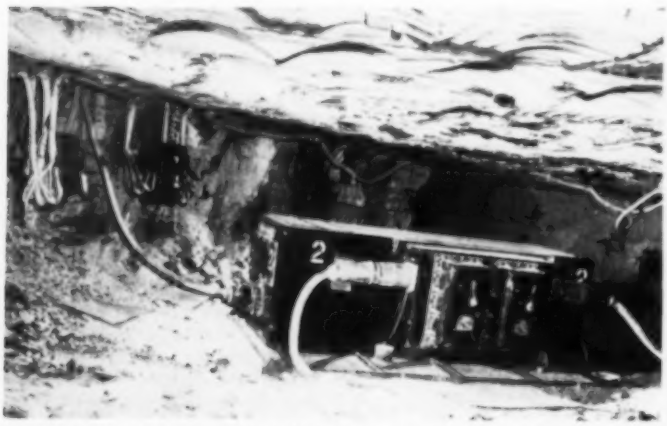


MAGNETIC CIRCUIT BREAKER at bottom of borehole is first protective device in Enoco underground AC system.

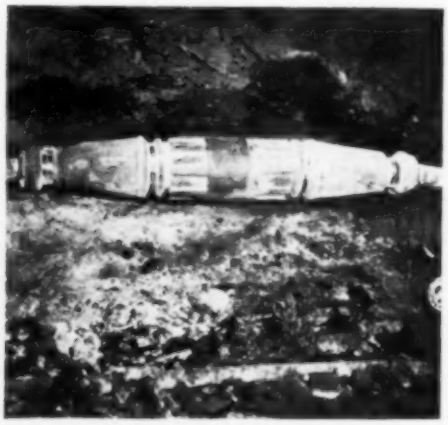


PRIMARY POWER is carried to section by 5,000-v 4/0 3-conductor cables. Neoprene Type G is preferred for this.

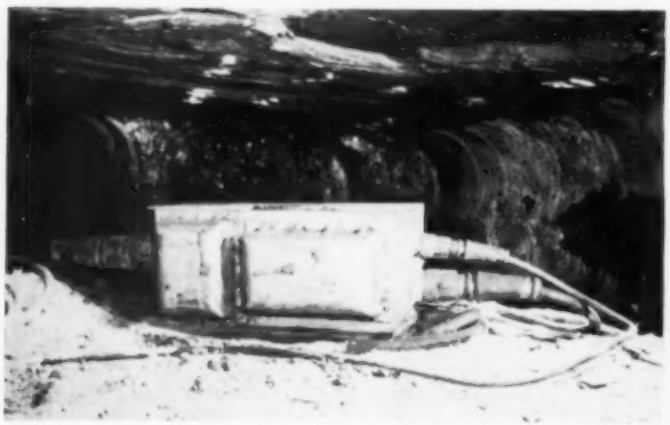
Enoco AC Power Setup Includes These Components



PERMISSIBLE JUNCTION BOX with two outlets is provided for each working section. One outlet serves pickup loader, other supplies miner.



ATTACHABLE permissible connectors join 150-ft sections of primary and secondary lines.



PORTABLE dry-type 300-kva transformer steps 2,400-v power down to 440 for operating AC face equipment. Unit weights only 7,000 lb.



AC BOOSTERS: John A. Stachura, general superintendent, Eugene Stacey, chief electrician.

chine. Breakthroughs are turned 90 deg with the headings, starting from the intake heading and continuing across each of the other headings.

Some headings are driven without any problem of gas accumulation at the face. In other areas extreme care must be taken because gas begins to accumulate as soon as the boring head advances a few feet into the coal. When this happens steps are taken to prevent a buildup of methane that would result in an explosive mixture. A Mine Safety Appliances automatic methane detector and alarm mounted on the machine warns the operator when methane is building up.

To get the maximum volume and velocity of fresh air over the cutting head of the continuous miner with a minimum of interruptions in the air current Enoco has adopted the following plan. A door 10 ft wide is installed in the No. 4, or intake, heading far enough outby the last open breakthrough to permit the continuous miner, pickup loader and shuttle car to work at the face with the door closed. Air flows through the opening to the right of the door and is directed to the face by a line curtain.

Doors also are installed in Nos. 2 and 3 headings and in the two breakthroughs between Nos. 1 and 2 outby the last open one. Brattice cloth is hung in breakthroughs between Nos. 3 and 4.

A minimum of 10,000 cfm of fresh air must be kept flowing around the end of the brattice cloth to keep the faces free of methane and permit the machine to bore 8 to 12 ft beyond the last point of advance.

As the Colmol alternates from left to right while driving the heading, the line curtain is hung alternately on the left and right sides. Thus the curtain is hung on the right side if the Colmol is working on the left side and on the left side if it is working on the right. This method keeps air sweeping the face at all times. The job of hanging the curtains is simplified by the use of an American Mine Supply Co. spad driver.

PILLAR RECOVERY

A completely new system of mining and ventilation had to be worked out for room and pillar work with continuous miners. Entries had to be developed to provide bleeders around the caved areas and bleeders had to be connected to the main return airways. Regulators control the flow of air in the bleeders.

During the development of a room panel three headings serve as intakes and one as a return. When development is completed, the bleeders become returns and the four headings become intakes. Thus all doors are eliminated in the panel headings.



ENOCO ENGINEERS include Robert Eskew (left), mining engineer, and Roy Kattman, chief engineer.

In setting up the panel for pillar extraction, four rooms on 60-ft centers are driven from both sides of the headings and cut through to the bleeders. Next a complete row of blocks is removed across the back end of the panel. Pillaring starts on either side at the pillar next to the bleeder and progresses toward the headings, crosses the headings and continues into the room pillars on the other side. The Colmol remains on this side of the headings and carries out the same procedure in the opposite direction, finishing at the bleeder on the starting side.

The next step is to drive two more rooms on the side where the last pillar was removed, then advance two on the opposite side of the headings. Two rows of pillars then are recovered as before. This method continues until the panel is completely mined.

Pillar extraction was completely new to all Enoco employees when it was started with the continuous miners. Special attention was given to training men in the proper safety and mining procedures. In the mining operation every effort was made to leave as few stumps as possible. Wherever possible pillars are mined by the open-end method.

Roof in the pillar area is supported by straight props. As soon as the continuous miner is sumped into the pillar, timbers can be set 1 ft from the machine and to within 11 ft of the solid coal. The machine operator exercises care to leave stumps that are small yet large enough to prevent sudden or unexpected falls of roof.

Management reports that pillar mining is greatly simplified with the continuous miners, compared to conventional methods. Since a minimum of roof area is exposed for a short period of time, the rock does not have time to deteriorate. Consequently, roof problems are greatly reduced.

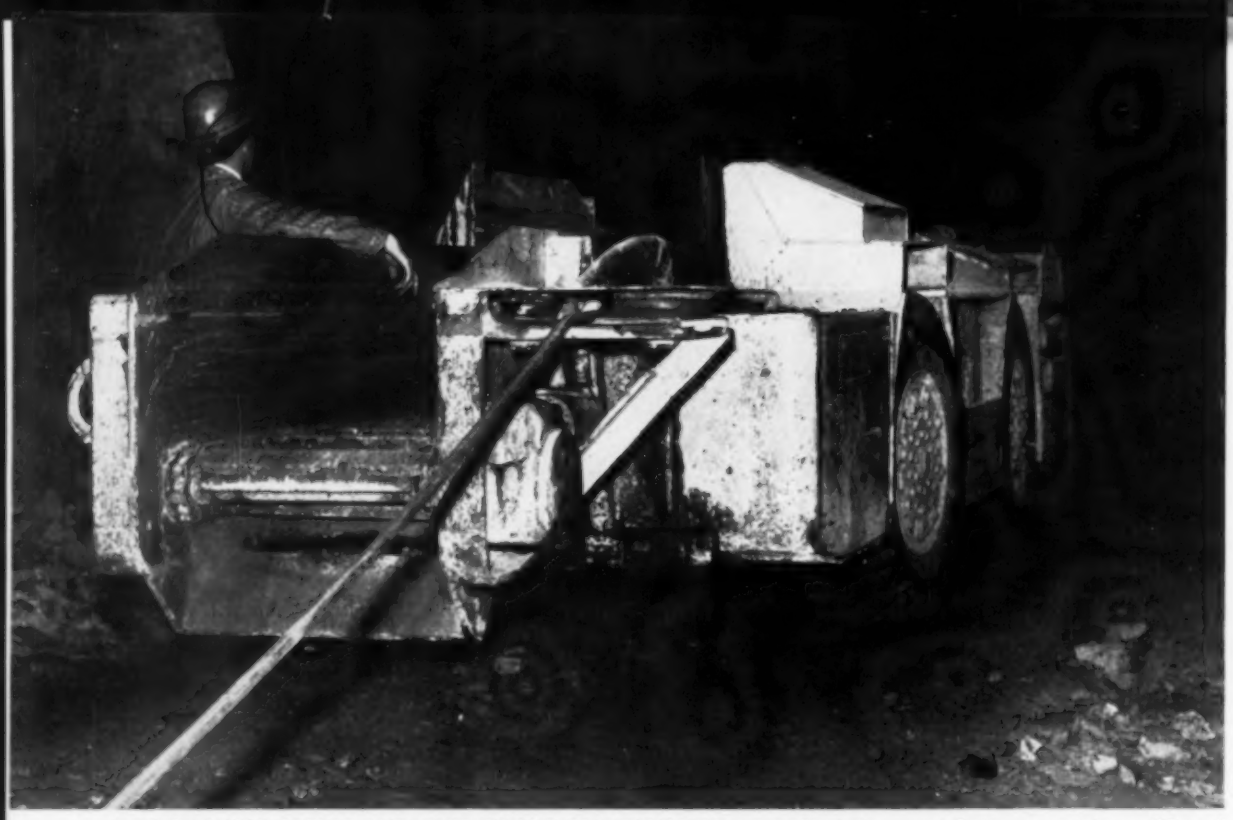
Enoco has found that the Colmol output is greatest when working in pillars. A flat pillar line in which the pillars are removed one at a time has been found to be the best way to mine with the Colmols. There has been no pressure on the pillars or "riding," and excellent falls are obtained after pillars are removed.

LONGER BIT LIFE

Longer life for carbide bits on the cutting heads of the continuous miners has resulted from a program of research at Enoco. Bits originally were held in place in their holders by setscrews. Because of the severe cutting conditions, trouble was experienced with the set screws and, as a result, the company started experimenting with a bit that could be wedged tightly into place. Bits and holders with 3-, 4½-, 6- and 7½-deg tapers were made and tested in the mine. Of these, best results were obtained with the 6-deg units. Efforts then were concentrated on perfecting a bit and holder with a 6-deg taper which are now being used.

It takes the machine operators an average of only 15 sec to change a wedge-type bit whereas it took 40 sec to replace a setscrew unit. The workers like to work with the wedge-type bits and change them more frequently than they had previously. Thus sharp bits are kept in the cutting heads throughout the shift. Management reports that bit life has been increased greatly because they are held rigidly in place in the holder. Fewer bits are torn loose from the holders and lost in the mining operation. Thus bit cost is further reduced.

Each Colmol is teamed with a Joy loading machine, two shuttle cars and Fletcher roof-bolting machine. Shuttle cars discharge coal into 6-ton ACF dropbottom mine cars from loading ramps on each side of the track. Five-car trips are pulled to the sidetrack by Goodman and General Electric locomotives where they are combined into 25-car trips for the main haulage locomotives. Main haulage is assigned to 13- and 15-ton Jeffrey locomotives, which leave 25 empties and pick up 25 loads at the sidetracks. All locomotives are equipped with Femco trolleyphones to permit easy communication.



GOOD MACHINE DESIGN AND GOOD CABLE CONSTRUCTION are major factors contributing to maximum life and minimum cable cost. These are the responsibilities of the manufacturers of both machines and cables.

Getting More From Portable Cable

How machine design and cable construction, plus proper application and care in use, contribute to reliability, service and minimum cost for electric cables.

By WALTER THEODORE PEIRCE
Chief Cable Engineer, Electrical Cable Works, American Steel & Wire Div.,
United States Steel Corp., Worcester, Mass.

ONE CONSIDERABLE ITEM in the cost of mining coal is the portable cable that connects the electrically operated equipment with its source of power. Whether this cable renders a reasonable service, free from loss of production due to down time, depends on the joint efforts of the designer of the machine, the manufacturer of the cable, and the user of the cable. Just as a three-legged stool will not stand on two legs, so the cable will not operate well unless all three of these factors have received careful consideration.

1. Machine Design

The cable entrance should be located so that the cable can be paid out or picked up freely and kept out of the way of the wheels or auxiliary equipment. If the cable takeup reel is located properly with respect to the entrance, unnecessary bending and twisting of the cable will be avoided. The take-up reel must have a barrel which is proper for the size of cable to be used. Cable manufacturers recommend that the minimum bending diameter shall be twelve times the diameter of the cable. For flat-twin cables this means the minor axis, as such cables should not be bent on the major axis. Smaller bending diamters result in early fatigue failure of copper conductors, especially the ground strand in Type G twin cables.

It is preferable to have a long take-up reel, as this obviates the need of several layers of the cable. Smoother spooling will result. In addition, heating of the cable will be reduced due to better radiation. It is common knowledge that heat diminishes the physical strength of rubber, thus ren-

Even more important than the best Type G on existing drums, and in bind the sheath to the core over long



USER RESPONSIBILITY in attaining minimum cable cost involves proper application, care in use and good maintenance for maximum service.

dering it subject to severe damage.

The most important contribution of machine design to the life of the cable is the distributing mechanism that lays the cable on the takeup reel. If this cannot be, or is not, adjusted to the diameter of the cable and equipped for instantaneous reversal at the end of the traverse, the cable will build up at one spot. The result is an uneven strain on one of the conductors which will cause it to elongate, producing kinks. In extreme cases the elongated conductor will even rupture the jacket and stick through it.

As abnormal tensions cause many cable failures, attention must be given to reeling tensions and brakes. Soft-drawn copper has a yield point of about 10,000 psi, which means that a Size 4 conductor will take a permanent set if subjected to over 300 lb tension. The clutches and drags on the takeup reels should be adjusted to the strength of the cable used. Admittedly, such tensions will require clearing snagged cable manually but the extra work will pay off in greater cable life.

In most cases the basic design of the machine provides facilities for proper operation. It is the user's responsibility to see that the machine is properly adjusted to the particular work being done.

2. Cable Manufacture

The design of the cable itself is based on elaborate laboratory evaluation of each component. Yet such tests are merely indicative and must be backed up by long field trial under wide service conditions.

The conductor of portable power cables is always rope-lay construction: that is, the individual groups of wire are laid up, usually as a concentric strand having 7, 19 or 37 individual wires. Then 7, 19 or 37 of these groups are laid up concentrically to form the complete conductor. For a given number of wires, say 133, the conductor may be composed of 19 groups of 7 wires each or 7 groups of 19 wires. The lay or direction of twist of the finished conductor may be the same direction as that of the wires in the groups or the lay of alternate groups may be reversed (herringbone strand). In general, we have found the best results with the larger number of wires in the individual groups (such as 7 groups of 19 wires each) and with the lay of the groups opposite to the lay of the wires in each group.

For the major mine-cable application, which is low-voltage (600 or less) supply to operating equipment, the prime consideration of the insulation is the physical toughness of the rubber. The original physical properties are not so important as the strength of the insulation at operating temperatures, and after aging at such temperatures. While mining-machine cable capacities are determined for a maximum copper temperature of 60C (150F), the insulation should have a 75C rating to take care of the many unknown factors that cannot be encompassed in a calculated current-carrying capacity.

The best method of laboratory evaluation of a rubber insulation for mining cables is the compression cutting test in which the force required to push a rounded metal anvil through the insulation is measured. This test can be made readily while the insulation is at an elevated temperature, and after the rubber has been subjected to artificial aging by subjecting it to high temperatures while it is under pressure in an air or oxygen bomb.

ACHIEVING FLAME RESISTANCE

The various state and federal regulations for safety in mines require that the sheath be flame-resisting. A rubber-like material called neoprene satisfies this requirement and in addition is oil-resistant as well as tough and superior in aging to other rubber polymers. However, neoprene cannot be used pure as a vulcanizable sheath, and must be compounded.

The usual sheath has from 50% to 60% by weight (55% to 65% by volume) of neoprene with a specific gravity of about 1.45. The other major ingredient is about 30% carbon black used as a toughening agent. Such a formulation gives the manufacturer considerable latitude in building performance into his cable. A neoprene compound is not necessarily resistant to oil, or to sunlight and ozone. However, it can be made to incorporate those characteristics and at the same time possess the required toughness.

The sheaths of all portable cables are encased in a lead sheath and vulcanized in the mold formed by the lead, which is ultimately removed from the cable. Consequently, in addition to its final physical properties, the neoprene compound must possess the property of being extruded smoothly on the cable core as well as being firm in the unvulcanized state; this prevents it from getting out of shape, yet provides enough plasticity to adjust to the dimensions of the lead mold. These are all conflicting requirements and can be met to a satisfactory degree only when the manufacturer has sufficient technical skill at his disposal.

Even more important than the best selection of materials is the way the materials are put together, meaning the overall design of the cable.

Flexibility and freedom from fatigue failures demand that the individual members, particularly the conductor wires, be free to move to adjust themselves to the different length of circumference they assume when the cable is bent. If they cannot move, then a wire that is too long for its new position must kink to accommodate the shorter length. If it is too short, then it will stretch permanently. By so doing it will become too long for some new position.

By stranding or spiralling the elements, one section will be on the outside of a bend under tension while the neighboring sections will be under compression on the shorter circumference of the inside of the bend. If the elements can move, these two forces will neutralize without any permanent change in the lengths of the elements.

Yet, if the conductor is free to move with reference to its insulation, or the insulation is similarly free to move with reference to the sheath, dragging the cable over obstructions or through guides will allow the sheath to stretch and bunch up. Such bunching still further hinders the pick-up of the cable until either the sheath is ruptured or the conductors are broken.

Quite obviously, then, a compromise must be made in the design, based on the particular service required.

SERVICE DICTATES CONSTRUCTION

For single-conductor cable for shuttle-car service, it is necessary to bond sheath, insulation and conductors firmly together. Steel reinforced conductors are recommended for long lengths or severe pulls. Here the cable is small in diameter and the bending stresses on the wires are less severe. Such a construction is difficult to strip to make repairs but it is economical in the long run, since less repairs and down time result.

In the twin construction, insulation and sheath should be well bonded. However, some freedom of movement between conductors and insulation is desirable since such cables may be twisted, or wound unevenly on the takeup drum. By using a bridge wall, which interposes a strip of jacket material between the two insulated conductors, the required jacket rigidity is obtained, as well as increased resistance to shorting of the conductors.

The three-conductor, or Type G twin, is a special problem. To use the Type G on existing drums, and in present lengths, maximum dimensions have been standardized. These require the use of a ground strand in the form of a strip rolled thin and placed between the conductors. To do otherwise would require cutting the insulation or jacket thickness below safe minimums. The compacting of the ground strand tends to lock its wires together, while the fact that it must bend across its major axis subjects the individual wires to maximum strain.

We have obtained greatly improved service life by placing a film tape between the ground strand and the bridge walls. This film tape cushions the ground strand from the main conductors to prevent its being locked in place by the sheath compound, and by introducing a lubricant in the lay of the ground strand the wires are permitted to move with greater freedom. Even with these improvements, it is doubtful if the ground strand will have a life comparable to the power conductors until the industry will permit greater latitude in overall dimensions.

The shorter service life of twin Type G cables has resulted in a relaxation of the Federal Bureau of Mines' requirement for grounding off-track equipment and active investigation of other protective measures. One of the most promising of these developments is the use of a ground-detector relay in the ground conductor which will permit the use of a much smaller cross section ground conductor. The use of a smaller conductor will permit a better cable design with enhanced cable life.

Round cables for use on surface equipment and for manual handling underground must have complete freedom of movement between the conductor and ground wire insulation and sheath. This can be obtained by using fibrous fillers in the interstices. Fiber fillers, however, result in a cable which is soft and consequently subject to deterioration from moisture and rotting. It is preferable to use rubber fillers and to keep the sheath free from adherence to the conductor insulation by covering each conductor with a film tape separator or encasing the core in a stretchable paper-tape separator.

Unfortunately, such a construction will not work when used on AC operated underground equipment where the cable is subjected to continuous rereeling under tension. As pointed out previously, the jacket slips and bunches on obstructions and guides. Since such cables are usually in the 600-v class, they should be made with a covering on each conductor that will bind the sheath to the core over long distances but permit the insulated conductor to slip within the sheath for the movement required when the cable is bent.

3. User Responsibility

In the final analysis, the success or failure of a cable is in the hands of the man who uses it. He may be lulled by extravagant claims into believing it will take any abuse he gives it. The fact is, it is not economical to abuse cable.

Management's first responsibility is to see that equipment has the proper controls to permit good operation. Secondly, that working spaces are laid out with full consideration for convenient power supply, and that planning of operations takes into consideration the presence of the power conductors needed to the end that unnecessary traffic over them will be avoided.

The next important point is to get facts.

What is normal cable life?

How does it compare with others?

What does cable replacement cost?

What causes cable failure?

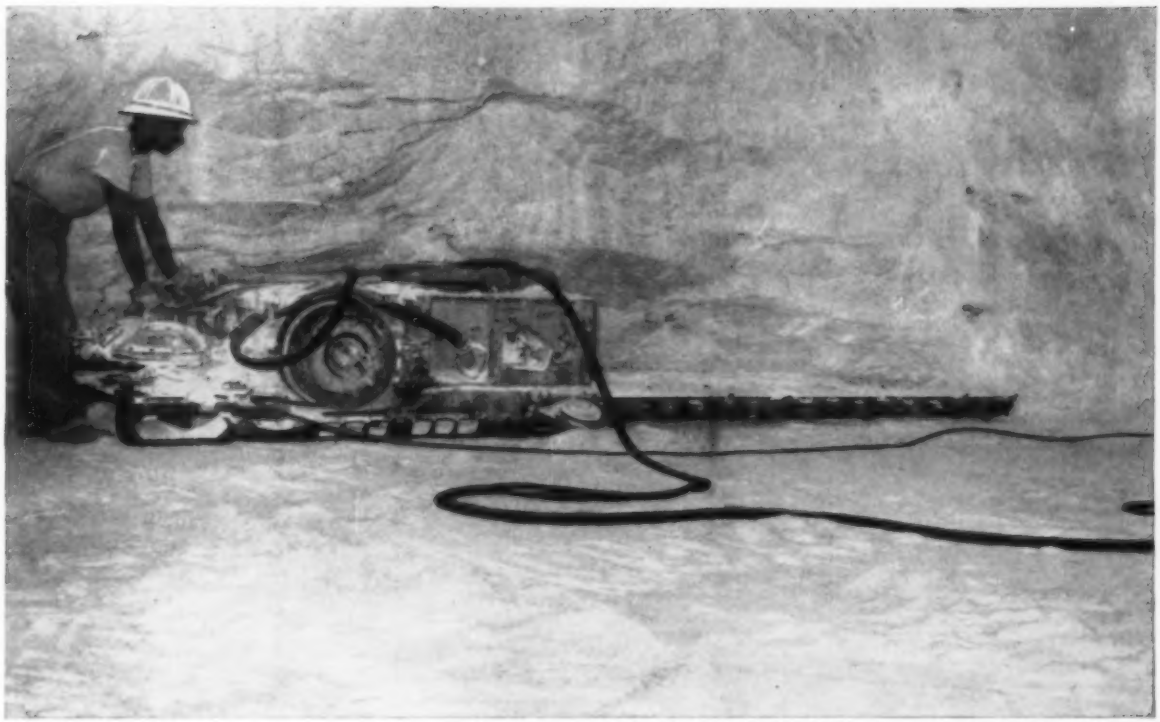
Your answers to this will govern whether it is advisable to keep more detailed records by machines, operators or type of service. Of utmost importance is the need to train one or two individuals to identify causes of failure and to determine how they can be avoided.

Armed with such facts you have the groundwork for effective employee education. Your employees should recognize that any AC or DC voltage can be fatal under the wet, humid conditions existing in mines. Moreover, faults may start fires or explosions. Consequently, cables and electrical equipment should always be handled as if they were potentially dangerous.

Cables cost money and this cost either adds to the price of coal, making it lose out competitively, or subtracts from the money available for wages. In either case the man loses.

Proper care of cable takes a little extra time and effort, but not nearly so much as the down time required to repair or replace a cable.

To conclude, cooperation is the keystone in cable results. This means cooperation between the miners and their management, between the machine designer and the cable manufacturer, and finally between all four to put everything in proper perspective and achieve maximum cable reliability and service and lowest cable cost.



Developed for special potash mining conditions...

KENNAMETAL* U-10 Cutter Bits now give outstanding performance in coal mines

In mining potash, a salt layer beneath potash ore makes undercutting very difficult. The salt, while not extremely hard, is tough. Regular, wide-tipped bits cause cutting machines to draw excessively high loads, often resulting in burnt out armatures.

To help meet these special conditions in potash mining, Kennametal developed the U-10 Style Bit, designed with a narrow insert and additional side clearance. The tough salt formation is now cut easier, faster and with *less power*. And the cuttings are coarser, with very small percentage of extreme fines... one reason for their use in salt as illustrated above.

U-10 Bit performance in coal mines

These advantages, plus the low cost of the U-10 Bits brought about their use on continuous miners in coal mines. First, they were tried in problem areas, particularly where impurities run high and conditions are extremely tough.

Because they performed so well, the U-10 Bits were tried in clean coal. Here they give outstanding performance: cut much faster, produce coarser coal, and use much less power than other bit styles.

If you haven't tried Kennametal U-10 Style Bits, ask your Kennametal representative to tell you about them. He'll gladly show you reports of U-10 Bit performance under different conditions. Or write to KENNAMETAL INC., Mining Tool Division, Bedford, Pa.

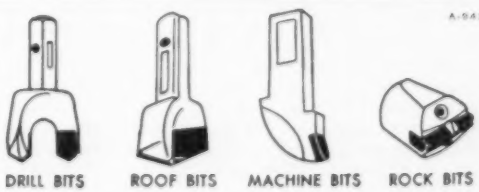
KENNAMETAL
U-10 Bits provide

- free cutting
- fast cutting
- coarse coal
- good clearance
- low power consumption

*Registered Trademark

A-9436

INDUSTRY AND
KENNAMETAL
...Partners in Progress



FOREMEN'S FORUM





FUTURE ENGINEERS? Coal's projected growth calls for their services.

Your Son in a Mining Career?

Give your alert, resourceful boy the facts about career opportunities in the growing coal industry. Active young men can find full satisfaction in work that offers both challenges and rewards.

THE AIR IS CHARGED with expectancy as the new year rolls along. All reports on the Nation's economic health at the end of 1955 point to the fact that the United States is experiencing one of its characteristic surges. There may be counter-surges and adjustments along the way, but it's almost certain we'll move up to higher and higher levels of economic activity. Our population is rapidly increasing, and everybody needs more or wants more. Most of our people who are able to work appear to be willing to work to provide the required goods and services. Furthermore, other parts of the world are reporting a similar upsurge. The atmosphere of the day may best be described as "controlled feverish."

Perhaps at no other time in our history have young people had so many exciting career possibilities open to them. For example, we need multitudes of good teachers who will help our children become sensible custodians of their heritage. We need large numbers of clergymen, social scientists, medical experts, lawyers and others like these to nurture the Nation's human resources to highest levels of effectiveness. We need scientists of unparalleled ability who will help us realize the fullest benefits of the atom.

But we shall also need intelligent, dedicated men to plan and supervise the mining of coal because much of the energy we will consume in making and moving the products to satisfy our needs will have to come from coal. Mining engineering and mine supervision are careers to challenge any bright, nervy young man who is made aware of the opportunities in the field. Within the past year, the coal industry has begun to demonstrate some of these opportunities in its development of large new properties to meet the growing demand for our product.

Since the pace is faster, the demand for highly-trained engineers and supervisors is more urgent now than ever. Don't fail to inform your son of these matters as he struggles manfully with the problem of choosing a career. He may be singularly qualified for a career in mining engineering. Or in mining-electrical engineering, for that matter.

ATTRIBUTES OF A GOOD MINE SUPERVISOR

What are some of the traits that might be exhibited by a prospective good mine supervisor or engineer? We think perhaps

Ozone didn't K.O. this cable!



shock-tested for 6000 hours

U.S. ROYAL MASTER power cable still stands up!

Amazingly better than *any* of the five leading brands tested!

United States Rubber Company technicians tested U. S. Royal Master Power Cable against 5 leading competitive brands. Here's the test, and the results:

A sample of 5 KV unshielded U. S. Royal Master Power Cable and 5 other competitive cables were each bent into a U-shape, roughly 8 times overall diameter. Placed upright on a grounded metal plate, a conductor-to-plate potential of 40,000 volts was applied. All 5 competitive cables failed within 20 minutes to 35 hours. The U. S. Cable was still going strong after 6000 hours!

No other cable approaches U. S. Royal Master in performance and economy. Order cable from your distributor or write Electrical Wire and Cable Dept., United States Rubber Company, Rockefeller Center, New York 20, N. Y.

Adequate Wiring can be the two most important words in your manufacturing economy. Obsolete wiring can cause power failure, increase maintenance expenses and reduce your production. Make sure your present wiring is not only adequate for today's power needs, but also sufficient to carry the ever-increasing electrical loads required in your future growth.

US RUBBER

Electrical Wire and Cable Department

United States Rubber

the main ones are these (as they might appear in a teen-age fellow):

Interest—A sustained curiosity concerning the details of mine layout, mining machinery, coal handling and so on. He listens contentedly while his father talks mines and mining with his friends. He wants to visit the property often. These are outward manifestations of interest. You no doubt have better ways of knowing when your son is really interested in something.

Resourcefulness—A resourceful young fellow is never bored. He seems always to have some project in which he can become completely absorbed. Often such projects are initiated and developed by the young fellow himself. You've seen effective supervisors work the same way.

Tenacity—The ability to stick with a job until it is finished is a good trait. It is important also to continue in a program until some definite objective is achieved. You can see this characteristic in the young men who stay with a Boy Scout group, for example, until they attain some satisfying level of achievement. Tenacity is not merely a physical trait; it demands mental discipline.

A young man showing these characteristics reasonably can be expected to absorb the training that will help him become a welcome addition to the staff of the coal industry.

WHAT DOES THE INDUSTRY EXPECT?

The industry, because of the nature of its operations, has a right to expect certain standards of performance from its engineers, supervisors and other officers. Among the most important are these:

Technical Competence—After a reasonable length of service in the industry the young engineer should be able to demonstrate that he has a solid grasp of the fundamentals of his profession. It is hoped his superiors will teach him to reconcile pure theory and practical application in a balanced manner.

Cost Consciousness—The desire to devote one's best efforts to turning out a unit of production at lower cost is laudable in an engineer or supervisor. This constant emphasis on getting more mileage out of each invested dollar or cutting the cost of the product has been an important factor in setting off the upsurge mentioned earlier.

Compassion—This means the industry expects its officials to have an understanding of the human factors involved in production. The health, safety and relative comfort of the industry's employees are first in importance.

Developing these three attributes in young candidates for official positions is partly the responsibility of the industry and the educators and training agencies serving it. The young fellow is also responsible for his own development, of course. But if he comes with interest, resourcefulness and tenacity, then he deserves to be shown and informed how he can best prepare himself for a satisfying career in mining.



INDUSTRY LEADERS AND OFFICIALS can interest boys in mining careers through sincere advice and patient teaching in practical matters.

WHAT REWARDS CAN BE EXPECTED FROM MINING?

The returns from any career should not be measured in money alone. However, it appears now that the coal industry is in a position to bid in the marketplace for the services of the best men. Starting salary, though, is only one consideration, and it should not be the biggest element in the picture as a young fellow selects a job. More now than ever the coal industry is moving promising young men along to positions of greater responsibility. As you look about the industry you can see a number of young engineers and operating officials doing excellent work in positions of great responsibility.

Financial remuneration grows, as it should, with each increase in responsibility, but the advancement from one challenge to the next higher one also is a form of reward which is cherished by any man who is serious about his career.

Most resourceful, competent young men like to be leaders. The sense of leadership must be strong in a man who will direct the efforts and guard the safety of a number of other men, underground. The knowledge that one is able to act in this capacity is a reward in itself.

Finally, there is the satisfaction of being identified with a basic industry, one that will continue to make tremendous contributions to our national growth and well-being, and one that is "glamorous" enough to make news even through its perilous days. Associations with other engineers and supervisors within the industry also become a valuable part of a man's professional life. The respect he gets and gives for ideas and performance among his colleagues in the industry grows in value as time passes.

WHERE DOES A YOUNG FELLOW START?

The industry offers great assistance to the young man who shows an interest in a mining career. Several high schools in mining areas offer vocational mining courses to interested students. A number of producing companies and operators' associations provide scholarships at accredited colleges.

The staff of the National Coal Association includes a director of mining-engineering education, M. D. Cooper, who co-ordinates the educational efforts of the industry and the colleges in this respect.

Many companies offer summer and vacation employment to active students to help them correlate theory and practice and accumulate experience.

There is interest among industry leaders, you see, and there is help available from the industry. While a college education still costs money, the lack of a thick bankroll need not deter any interested, resourceful lad from pursuing a career in mining engineering.

The emphasis in this has been on mining engineering. However, many of coal's scholarships may be awarded for studies in electrical or mechanical engineering. Furthermore, there will be room and opportunity in the coming years for all kinds of talent, including engineering, business and legal, for example.

YOUR SON IN A MINING CAREER?

If your boy shows an interest in your work, if you like the way he tackles problems and projects, and if you want him to be satisfied in his work, inform him of these opportunities. The final choice is his, of course, but give him the widest possible range of choice.

And if you are in a position to do so, help the eager young fellow in your company to find his work challenging and rewarding.

HOW DW21s ARE WINNING THE BATTLE AGAINST COSTS AT BIG HORN, WYOMING



This Caterpillar DW21 and No. 21 Scraper unit is on the job eight hours a day, six days a week. It's stripping overburden from a six-ft. coal seam and hauling it to mined-out pits of The Big Horn Coal Co., near Sheridan, Wyo. The DW21 loads to capacity and makes the half-mile round trip in seven minutes. There are also three DW20s with Scrapers, another DW21 with Scraper, two CAT* D8 track-type Tractors and two No. 12 Motor Graders on the job.

The fast, cost-cutting cycle times on this operation are a tribute to the speed, stamina and quick loading of the Caterpillar DW21 and No. 21 Scraper. Outstanding performer though this team is, a new, improved DW21 and No. 470 Scraper is now available to handle *even more material in less time at lower cost.*

The new DW21 Tractor (Series C) has 300 HP maximum output at 1800 RPM for stepped-up cycle times. Its new Turbocharger packs air into the engine according to load, not speed, for more working horsepower and greater performance.

The new No. 470 Scraper, with a heaped capacity of 25 cu. yd., features LOWBOWL design for bigger, faster payloads. The bowl is shallower, wider and longer for less resistance throughout the loading cycle. In actual on-the-job tests the Caterpillar DW21 and No. 470 proved to be the most productive unit in its class, enjoying an advantage of 20% or more over other makes.

There's a great new profit potential here. Get the full facts on the new DW21 and No. 470 Scraper from your Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

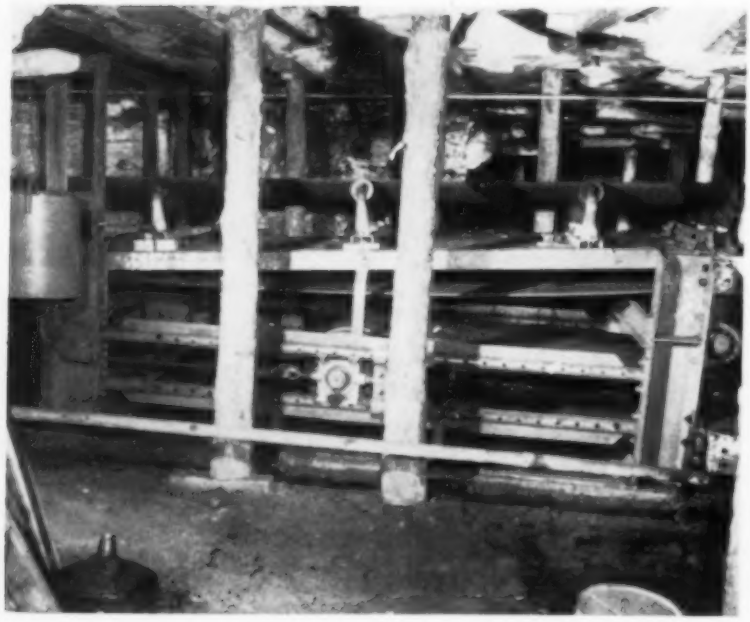
CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

OPERATING IDEAS

Self-Adjusting Takeup Smooths Belt Starting



SMOOTH STARTING of a 3,000-ft belt driven by a 150-hp, 440-v squirrel cage motor is made possible with a self-adjusting takeup that pulls in the slack when the unit is started. Management points out that most similar belt installations would have a slip ring motor on the drive. However, at New Kathleen they have found that the belt takeup used with the squirrel cage motor is very satisfactory.

A manually operated takeup was first used on the long belt but it required too much attention and didn't do a satisfactory job. To eliminate the headache caused by having to adjust the manual unit, the self-adjusting takeup was built.

The takeup pulley is mounted on bearing supports that move back and forth between two guides made of 2½-in tubing. Two steel buckets filled with worn out cutting machine bits act as counterweights. Wire ropes attached at each end of the takeup pulley are connected over a set of pulleys to the counterweights.

Takeup force is applied to ends of the takeup pulley by the wire ropes connecting the counterweights to the pulley. The pull on the takeup can be changed easily by adding or removing bits.

Crawler-Mounted Crane Lifts Big Conveyor Pans

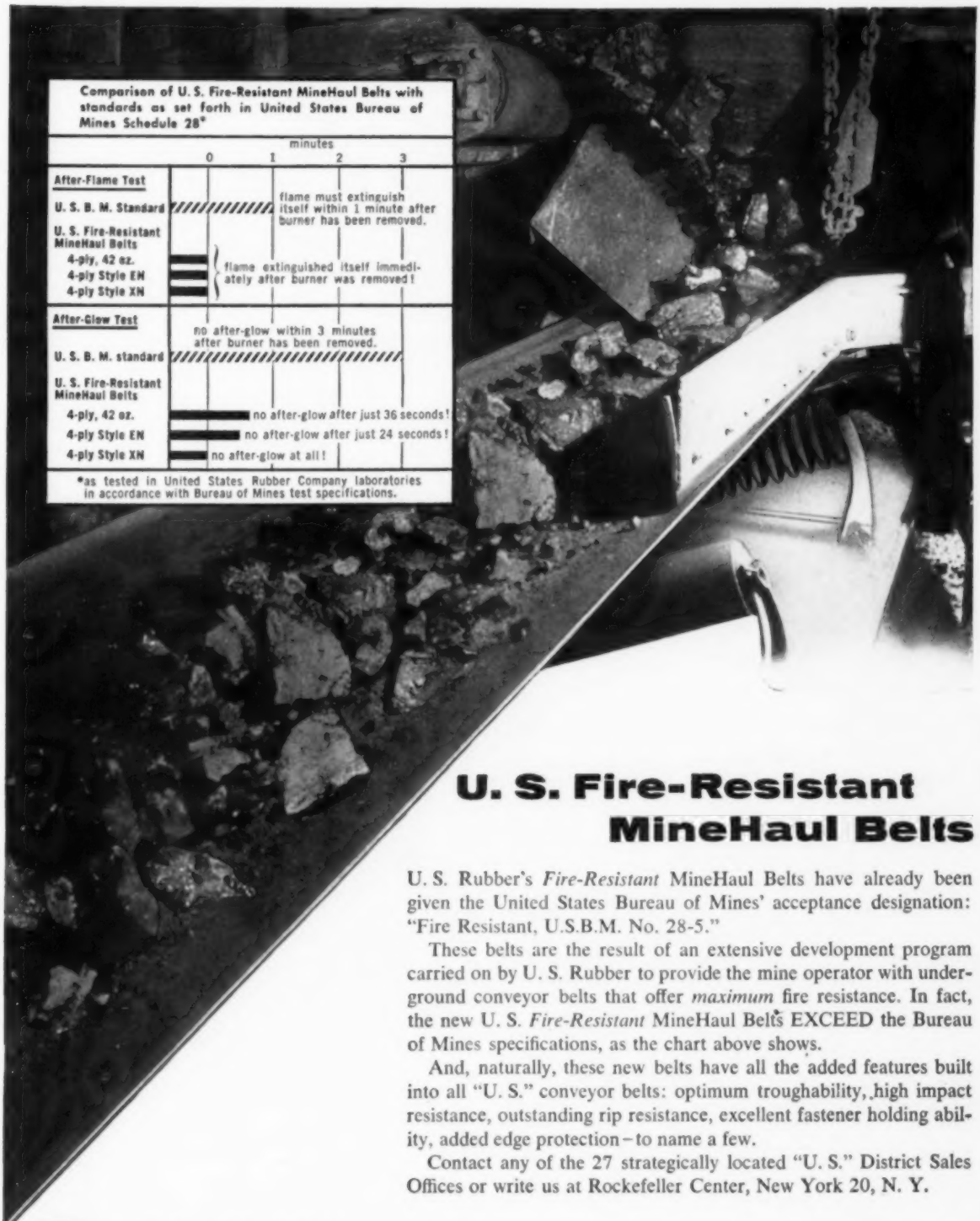


SAVING TIME and effort is the job of this versatile crawler-mounted crane. Campbell Tyner, chief electrician at New Kathleen mine, demonstrates how it is used to pick up heavy 12-ft-long sections of a belt conveyor. Whether a conveyor is being lengthened or shortened, this machine saves a lot of hard labor and time. The unit also has a winch, capable of handling 300 ft of ⅜-in rope, mounted on the front end.

The hydraulically powered crane was built on an old Joy 5-BU chassis. Two hydraulic jacks operating from the loader hydraulic system are used to position the boom horizontally and vertically. Two small wheels mounted at the base of the vertical jack fit over a curved track on the frame and permit the boom to be easily swung right or left by the horizontal hydraulic jack at the back end of it.

The front end of the boom has a telescopic section that permits the lifting force to be exerted over the center of the object being lifted. Thus a section of a belt conveyor or a heavy part can be raised vertically, carried to a transfer point for delivery to a new location.

Now ready for installation!



U. S. Fire-Resistant MineHaul Belts

U. S. Rubber's *Fire-Resistant* MineHaul Belts have already been given the United States Bureau of Mines' acceptance designation: "Fire Resistant, U.S.B.M. No. 28-5."

These belts are the result of an extensive development program carried on by U. S. Rubber to provide the mine operator with underground conveyor belts that offer *maximum* fire resistance. In fact, the new U. S. *Fire-Resistant* MineHaul Belts EXCEED the Bureau of Mines specifications, as the chart above shows.

And, naturally, these new belts have all the added features built into all "U. S." conveyor belts: optimum troughability, high impact resistance, outstanding rip resistance, excellent fastener holding ability, added edge protection – to name a few.

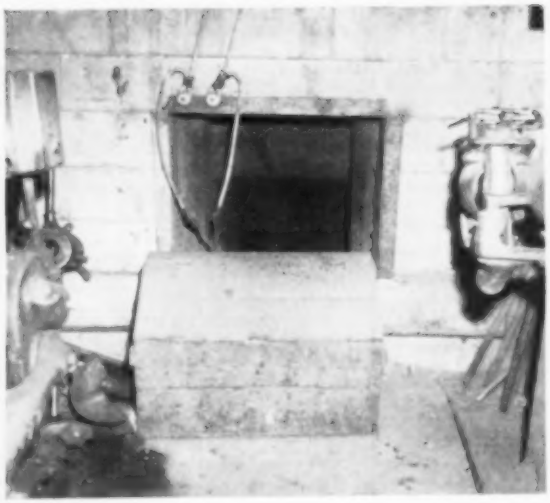
Contact any of the 27 strategically located "U. S." District Sales Offices or write us at Rockefeller Center, New York 20, N. Y.

US RUBBER

Mechanical Goods Division

United States Rubber



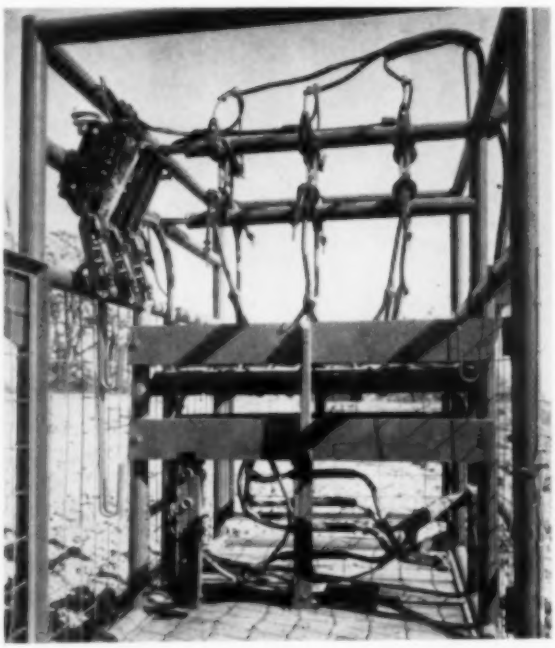


Mine Air Cools Shop in Summer

KEEPING COOL probably doesn't enter the minds of shop workers at this time of the year, but it isn't too early to think about how a shop can be made more comfortable next summer. Here's an operating kink that cost very little but made it possible to keep the New Kathleen shop of the Union Colliery Co., DuQuoin, Ill., at least 10 deg cooler during the blistering summer heat.

A discarded mine blower fan, a 5-hp 220-v motor, some worker ingenuity and some old oil drums were combined to work out a low-cost cooling system for the shop. Here is how it was done. The fan and motor were installed in a small metal building adjacent to the slope portal. The side of the building nearest the mine opening is hinged so that it can be opened to deflect some of the cool mine exhaust air to the fan. A ditch 200 ft long was cut between the fan house and the shop. Then old oil drums with the ends cut out were laid end to end in the ditch, and welded together to form a continuous conduit from the fan to the shop. A 24x36-in opening was made at the base of one shop wall to serve as an outlet for the cool air delivered by the fan.





Cable Junction Center Serves Four Circuits

SAFETY and flexibility are outstanding features of a cable junction center designed and built at the Delta Collieries, Inc., Marion, Ill. Equipped with connections for four separate 4,160-v cable circuits, the unit is designed so that any one circuit may be connected or disconnected safely and separately by means of knife switches. There also is a special connection for hooking up a transformer to supply 440-v power to pumps. Delta management reports that the first junction unit worked so well that three more are being built.



Splice Any Size Trolley Wire Faster With This O-B Hollow Screw Splicer

- 2-piece hollow screw splicer design fits easily over trolley wire bends and burrs.
- Two different size wires are quickly, easily spliced together (takes only a minute to level them off with a file).
- Insures a smooth underrun with any size Figure 8, grooved, or No. 9 Section wire.
- Permanent holding strength up to 4000 pounds.

Order Catalog 22270.



4 hollow screws tighten quickly and easily.

Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers



O-B Bail-Type Shells and Plugs

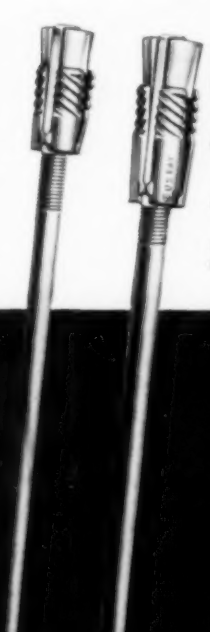
Speed up Bolt Installation

"They Go Up Easy and They Stay Put!"

- Bail allows shell fingers to flex against hole wall, eliminating hang-ups in the hole and preventing bolt from falling out before wrenching.
- Factory assembly insures correct positioning of plug in shell for maximum expansion, maximum holding power.
- All units coated with rust preventive and shipped in husky cartons to reach the face just as they leave the factory.
- Available for ⅝-inch and ¾-inch bolts.

Left-Small O-B Bail-Type for ⅝-inch bolts. (Catalog 22435)

Right-Large O-B Bail-Type for ⅝-inch bolts, (Catalog 22463) and ¾-inch bolts (Catalog 22378)



Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers



Easy To Work With!
Because It's an
O-B Hollow Screw Clamp

- Easily accessible in hard-to-reach places because a hex wrench is the only tool needed.
- Two-piece body clamps around trolley wire, is held tight by two hollow screws.
- Slim jaws allow free passage of collector shoes without bumping or scraping.
- Low overall height (1⅝-inches) saves headroom.

Order Catalog 16227.

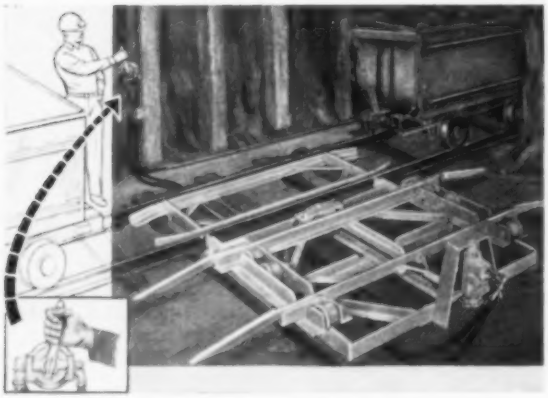
Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

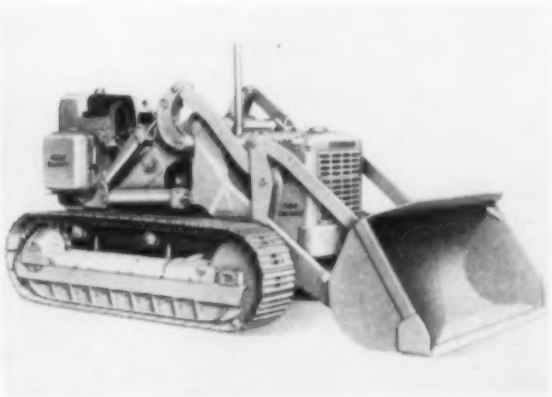
Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

EQUIPMENT NEWS



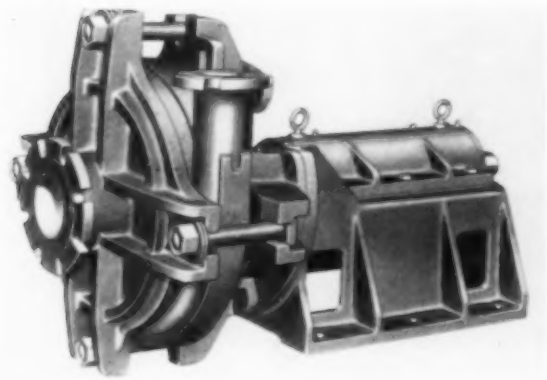
Air Operates Mine Car Transfer

The American Mine Door Co., 2000 Dueber Ave., Canton 6, Ohio, says it has "perfected" a compressed-air-operated unit as an addition to its mine-car transfer. The air mechanism, the company says, will transfer a 6-ton load with the flip of a switch handle and cut down the number of men needed to clear a main track from three to one. A complete transfer includes a truck, center and runout sections. The runout section is equipped with air motor, chain, pulleys and a 4-way valve. Standard equipment includes 30 ft of ⅜-in air hose.



40 Deg Tip-Back At Ground Level

Caterpillar Tractor Co. has introduced its newest and largest tractor shovel, the No. 977 "Traxcavator." Using a 2¼ cu yd bucket, the unit features a differential lever on each of the lift arms that makes a 40-deg bucket tip-back possible at ground level. Cycle time has been lowered, the company says, since the bucket can pick up a load in a single pass without declutching. Other features: automatic bucket positioner; fender-mounted hydraulic oil filter and hydraulic valve and tank. Caterpillar Tractor, Peoria, Ill.



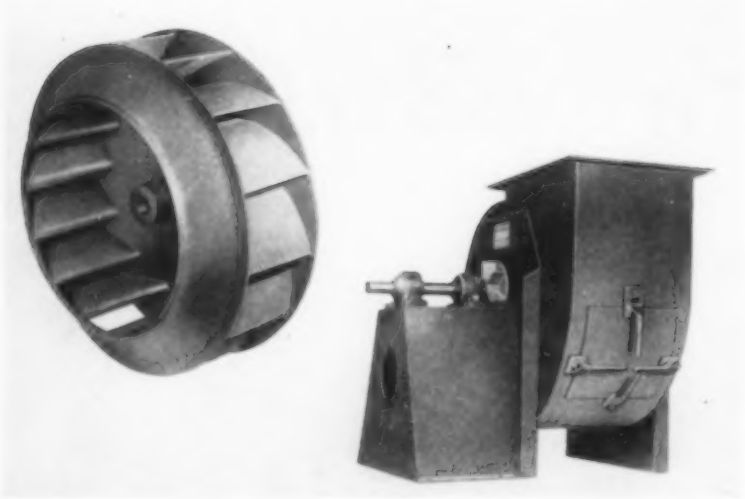
Piping Stays Put During Repairs

A heavy duty end-suction pump has been introduced by Morris Machine Works, Baldwinsville, N. Y. Designated Type Q, the low speed, continuous duty pump is designed to handle abrasive slurries of coal. It is sold in 2- to 6-in sizes. Features: Removal of only four bolts for maintenance without disturbing piping; interchangeable liners on each side of the impeller; adjustable rotating element; external vanes on each side of the impeller to prevent packing.



Nuts Run To Preset Torque

Ingersoll-Rand, Phillipsburg, N. J., announces a torsion-bar Torque-Control Impactool for running nuts to a desired preset torque. Type 5430T (photo), may be set to deliver maximum torque of 550 ft-lb, then shut off automatically. A smaller unit, 5040T, exerts a maximum of 90 ft-lb. Both units feature positive control, simple setting, full reversibility, no clutches, low maintenance. Interchangeable torsion bars may be used to provide different torque ranges.



Fan Efficiency Up, Power Use Down

Chicago Blower Corp. says its new "Chicago Airfoil" centrifugal fans achieve efficiencies of more than 92% while operating on 35% less power than flat-blade fans of the same capacity. Noise level has been reduced 65% the company also claims. The claims are based on the fans' main feature, newly designed hollow-section, aerodynamic-shaped airfoil blades. Chicago Blower says the design is the "first completely new departure in 40 yr from the standard flat-bladed backward-curved types." The design is also said to eliminate eddy currents that create turbulence and noise. The die-formed, hollow-section blades are welded to a heavy steel back plate, to which a solid turned steel hub has been welded. All wheels utilize an aerodynamically designed plate, or shroud, spun from heavy-gage steel that is welded into place and acts as the outside support for the blades. Housings are continuous-weld plate steel. 9869 Pacific Ave., Franklin Park, Ill.



Steel-Locking Latch Drill

A new version of its Model 75 air-operated rock drill is being produced at the Los Angeles, Cal. plant of Thor Power Tool Co., Aurora, Ill. The drill, labeled Model 77, has been equipped with a latch-type front head designed, the maker says, to assure a positive lock when pulling drill steels mounted on a sinker leg. The "77" weighs 55 lb and is said to drill up to 20 ft in hard-type rock, especially "where fast footage is an important consideration."



Boom Telescopes Despite Full Load

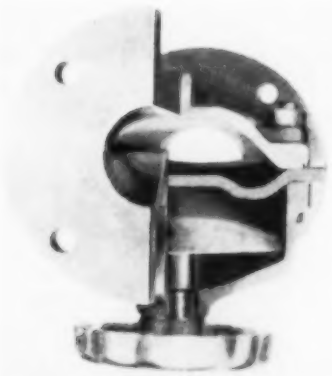
A boom capable of telescoping while bearing a capacity load is being sold by the Pitman Mfg. Co. as optional equipment for its Model 60 Hydra-Lift truck crane. Pitman says an operator can position the boom with its load outside a window, for instance, extend the boom hydraulically through the window, set down the load, then retract the boom and swing it clear. The Model 60 truck crane, itself, is a redesigned version of the Model "B" Pitman Hydra-Lift, a 6,400-lb crane requiring 40 in of space behind a truck cab.

Features: hydraulically-operated outriggers as standard equipment, choice of raising load with loadline or boom. 300 W. 79 Terrace, Kansas City, Mo.



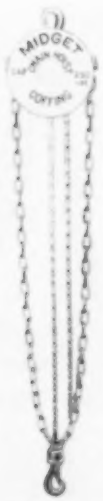
Tachometer Signals Speed

A tachometer being manufactured by the Metron Instrument Co., 432 Lincoln St., Denver 3, Colo., not only indicates speed, the maker says, but actuates self-contained power relays that signal overspeeds and underspeeds. A manual reset button resets the instrument. Available with any one of 48 scales marked RPM, FPM or Sheets/Hour.



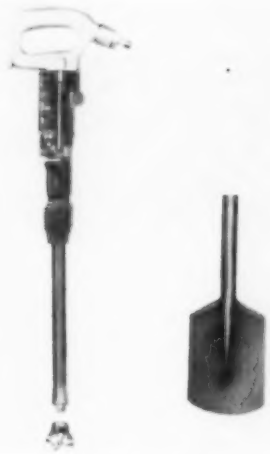
Valve Flow Unrestricted

Straight-through flow with no damming to trap suspended matter is one of the advantages of the "Wynn Straight-Through Diaphragm Valve," declares its manufacturer, Stockdale Engineering Co., Haddonfield, N. J. Said to be particularly useful for providing two-way, leakproof control of acids, oils, alkalis, slurries and most hard-to-handle fluids, the self-draining valve has been designed to provide an unrestricted path for fluid to pass across the smooth valve floor. Pressure is kept up and, the manufacturer says, clean-out ports are eliminated. The diaphragm, made of flexible rubber or other material, is molded in the "as closed" position. Bolted between the valve body and cover, the diaphragm is supported and controlled by the compressor in closed, throttling and open positions. No packing is necessary, the manufacturer says, since the fluid cannot come in contact with the valve stem or working parts at any time under normal conditions.



Midget Hoist Lifts 250 Lb

An 11-lb "Midget Chain Hoist" capable of lifting 250 lb has been developed by Coffing Hoist Div., Duff-Norton Co., Danville, Ill. The hoist is being produced with a standard lift of 7 ft and a minimum distance of 9 in between hooks. Extra chain is available for greater lifts. Coffing says that one man can easily lift a load 30 ft in 1 min with the midget hoist. The company also says that each hoist has been factory tested at 100% over rated capacity and that a load is held safely by an automatic load brake.



Hammer Has Action Option

An air-operated all-purpose utility hammer featuring "stop rotation" for alternate use as a rock drill or as a cement chipping hammer has been introduced by Thor Power Tool Co., Aurora, Ill. Named the "Thor No. 15 Utility Hammer," the 14-lb tool is said to permit instantaneous change from rotating to straight hammering action. The hammer cuts round holes up to 1⅜-in diameters. Exhaust air expels chips and a simplified lubrication system has been engineered into the tool, according to the manufacturer. The hammer will be furnished in two models, 15D and 15W. The 15D is intended as a dry tool, the 15W as a wet tool to meet the problem of dust control. Overall length is 17¼ in with a ⅜-in air hose and air hose inlet provided for. The standard chuck supplied is a ⅞-in hexagon 3¼-in for long-shank accessories.

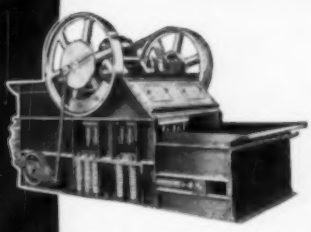
Braided Hose Constructions

Two hose products, a braided wire type for air or water and an all-purpose type, have been introduced by Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J. The air/water type has been constructed for extra safety at pressures to 2,000 psi and, although light enough for pneumatic tools, is said to be strong enough for air actuating service on the heaviest machinery and loading equipment. Sold under the names "Super-Master BW Air" and "Super-Master BW Water," the hose has been constructed of steel braids, neoprene tubing and a yellow cover for visibility.

The second hose, an all-purpose type, is said to be suitable for use with air, oil, water and mild chemicals. Its trade name is "Allflex." The company says it is the first all-purpose hose of mandrel-

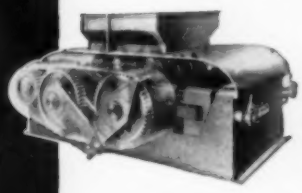
America's most complete line of CRUSHING EQUIPMENT

AVAILABLE FROM STOCK AND ON SHORT DELIVERY



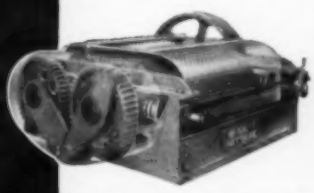
McNally Norton Vertical Pick Breaker

50% less fines when reducing lump to egg and stove sizes.



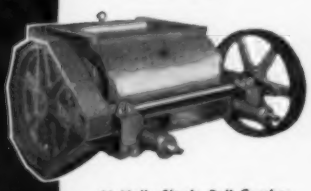
McNally Double Roll Gearmatic R. O. M. Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating Gearmatic drive.



McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages:
High volume production, plus accurate sizing, plus low percentage of fines.



McNally Single Roll Crusher

Universal application. 20", 24" and 36" dia. rolls.

For immediate action on complete information write, wire or call . . .

Mc

★ Pittsburg, Kansas ★
★ Wellston, Ohio ★

One Coal Preparation Cost that Can Be Cut



The SuperDuty® DIAGONAL-DECK® Coal Washing Table enables you to separate free impurities from your fine coal faster, better and at record low cost.

The separating efficiency results partly from the riffled deck designed to take advantage of the natural path of the material flow. The smoothly operating head motion and factory aligned under-construction contribute their part to efficiency and the cost-reducing performance of the table.

Results and costs, at any capacity, are under close control through unitary application . . . whether yours is a one-table plant or whether you need a battery of a hundred or more. The end result is the same.

Almost every important coal preparation installation of the past decade includes Super Duty tables. It pays to prepare your coal this efficient, economical way. Send for Bulletin 119.



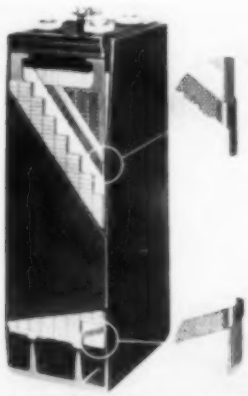
CONCENCO®
FEED DISTRIBUTOR

While unexcelled for feeding coal washing tables, the CONCENCO Revolving Feed Distributor effectively provides a splitting of feed into any desired number of equal portions, to accurately feed circuits or machines in battery for their greater overall efficiency. It is a heavily fabricated all steel machine with motor drive requiring 1 H.P. or less in operation.

THE DEISTER ★
CONCENTRATOR
COMPANY
903 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

made horizontally braided construction. "Super-Master" details, Bulletin 7107; "Allflex" details, Bulletin 7075.



Motive Power Battery

Exide Industrial Div., The Electric Storage Battery Co., has introduced a flat-plate motive-power battery to complement its "Exide-Ironclad" industrial battery line. It will be traded under the name "Exide-Powerclad," and is designed for use in electric industrial trucks and mine locomotives. Plate grids are constructed of "Silvium," a patented alloy. The grids are insulated with (photo) horizontally and vertically wrapped retainers and grooved microporous rubber separators. Dept. PC, Exide Industrial Div., Box 8109, Philadelphia 1, Pa.



Wire Clamp Made Safer

A mechanical wire-rope clamp said to be stronger and more quickly assembled is being manufactured by the Lamson & Sessions Co., 1900 Euclid Ave., Cleveland, Ohio. Known as the "Lamson Safe-Line Clamp," the unit can be assembled in the field or the shop. Constructed of two halves, the inside of each half has been grooved to hold wire rope. As the unit is tightened, the two halves come together in a grip designed not to slip. The clamp's construction permits reuse,

GM DIESEL
CASE HISTORY No. 556-188

OWNER: Badgett Mine Stripping Corporation, Madisonville, Ky.

INSTALLATION: GM "6-110" Diesel-powered Bucyrus-Erie 3-yard shovel loading fleet of GM Diesel-powered Euclid rear dumps on Pennsylvania Turnpike extension project.

PERFORMANCE: Partner Brown Badgett says GM Diesels are "doing a wonderful job." He's running his shovel 10 hours a day, plans to start 24-hour operation soon.

"Doing a Wonderful Job"



FEW WOULD expect to find a mine-stripping contractor on a road-building job. However, where there's dirt and rock to be moved in a hurry it is *not* unusual to find a General Motors Diesel-powered excavator. The faster, livelier crowd and swing of a "Jimmy" powered shovel means more yards per day at a lower cost per yard.

Principal reason for this snappy action is that a GM 2-cycle Diesel delivers power on *every* piston downstroke—not on every *other* downstroke as in 4-cycle engines. That means faster acceleration, instant response to throttle demands, real "go" when the bucket takes a bite.

And a GM Diesel costs less to maintain, too. Valves cost up to 62% less, cylinder liners cost up to 40% less, than similar parts for other Diesels.

More than 150 different manufacturers pick GM Diesel power for over 850 different models of equipment they build. Your GM Diesel distributor can give you the list plus full information on GM Diesel engines. See him today or write direct.

DETROIT DIESEL
ENGINE DIVISION OF GENERAL MOTORS
America's Largest Builder of Diesel Engines
Single Engines . . . 30 to 300 H. P. Multiple Units . . Up to 893 H.P.

GM GENERAL MOTORS DIESEL POWER

AND HERE'S *the* "BUSINESS END" *of the*

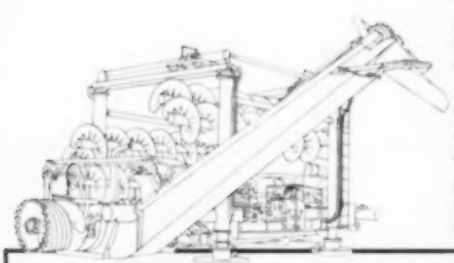


COMPTON COAL AUGER

● Just stop for a moment and study this photo of the Compton patented Lump Recovery Head . . . it certainly looks formidable even in print!

This non-clogging head was developed by Compton for exclusive use on the Compton Coal Auger. Driven by a power-packed diesel engine, the Compton Auger Head, with its top efficient core breaker, is a wonderful sight to behold as its 32 carbide tipped cutting bits cut and auger their way into the seam of coal in a jiffy.

A built-in spider bearing assembly provides "compass-straight" drilling with very little frictional drag. Engineered to cut coal at high speed, the Compton Lump Recovery Head will not clog and turns out a steady stream of coal from head to truck. Head diameters vary, depending on the size auger, from 44" to 28". The peripheral speeds maintained for all diameters makes it possible to get large tonnages even with the smaller diameter augers.



A Compton Coal Auger plus the Compton Lump Recovery Head will contribute to the efficiency of your operation. Call a Compton sales representative today . . . he is qualified to advise you on the possibilities which exist on your property for profitable Compton Auger Mining.

Compton, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

BOX 1946 ● TELEPHONE 4-6384

CLARKSBURG, WEST VIRGINIA

the company says. And because the clamp has fewer parts replacement costs are said to be greatly reduced. With no ragged edges of wire to catch, cut or tear, or nuts and bolts exposed to injure the workman, the clamp is believed "extra safe."



Transfers Wet, Dry Loads

An auger designed to handle dry and liquid materials is being sold by the Dultmeier Mfg. Co., Manning, Iowa. Named the "Auger-Scoop," the tool is adjustable from 16 to 21 ft and is 4 in in diameter. The company says it will operate with either a ½-in electric drill, electric motor or gas engine, and that it has been designed for many tasks—lifting water, transferring mixed concrete or cement into forms or conveying sand or stoker coal. The company also says the auger will operate at any angle. Dultmeier Mfg. Co., Manning, Iowa.



Cuts Field Time, Personnel

The newest addition to the Wild Heerbrugg instrument line is the T-2 universal theodolite transit. Ten accessories, electrical illumination, and distance measuring with use of the Wild

NOW AVAILABLE

BOWDIL CUTTER CHAIN WITH BIT OPENING ½"x1"



. . . every construction feature that has made Bowdil Chain the standard of the industry

This model Bowdil Chain has been made available in response to many requests from operators desiring the performance features of Bowdil Chains but whose existing equipment represents a sizeable investment (such as in sharpening equipment), where a changeover to complete Bowdil Bits is felt uneconomical at present, or where changing and varying conditions do not make such changeover practical. This ½" x 1" Bit Chain operates in all Bowdil Cutter Bars as well as all makes of other bars. Takes all types of ½" x 1" bits.

SALES ENGINEERS IN — Whitesburg, Kentucky — West Frankfort, Illinois Charleroi, Pennsylvania — Denver, Colorado — Big Stone Gap, Virginia Danville, West Virginia — Canton, Ohio — Birmingham, Alabama Helper, Utah — Kansas City, Missouri — Centerville, Iowa — Topeka, Kansas New Castle, England — Alberta, Canada

The BOWDIL Company

CANTON 7, OHIO



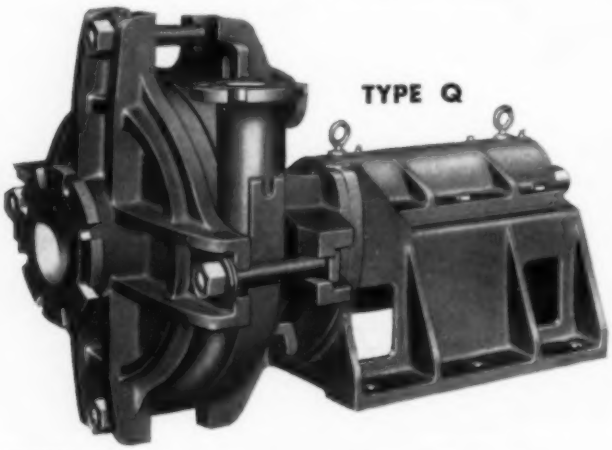
misfits cost money...

Coddling old pumps, "bargain" pumps or pumps that weren't engineered for the job can be an expensive proposition.

When misfits like this are put to work, they generally can handle only half the job they should. Often their "downtime" is greater than their operating time. And when pumps fail the greatest cost is not for repairs—but for lost production.

Start today by replacing "misfits" with new Morris pumps. For nearly a century Morris has been manufacturing a complete line of top quality pumps to meet the diversified requirements of industry. Every Morris pump has been specially designed and engineered to handle a specific job and to give you years of trouble-free service under the most rugged conditions.

Specify Morris when you want lasting pump value . . . it will save you money in the long run.



MORRIS CENTRIFUGAL PUMPS

● **Free Service.** Morris Engineers will be glad to recommend the pump best suited to your needs for size, capacity, etc. Send necessary data today to Morris Machine Works, Baldwinsville, N. Y.

invar subtense bar are designed to reduce to a minimum both the number of personnel and time spent on field parties, according to the company. The T-2 is adapted for all triangulations to the third and second order, and for precise surveys of every kind, the company says. Features include "an extremely clear telescope" with internal focus and coated lenses, reversible both ways, with signals aimed at distances up to 12 mi. Circle reading is achieved with a single microscope alongside the telescope. Direct reading to 1 sec is obtained on both circles, free from eccentricity error. Wild Heerbrugg Instruments, Inc., Main at Covert Sts., Port Washington, N. Y.



Goggle-Cleaning Station

Pulmosan Safety Equipment Corp. is selling a disposable goggle-cleaning station. The units contain a cleaner solution, wiping tissues and tissue refuse space. The solution not only cleans goggle lenses, says Pulmosan, but prevents lens fogging. The entire unit is thrown away when the supplies of solution and tissues are exhausted. 644 Pacific St., Brooklyn, N. Y.

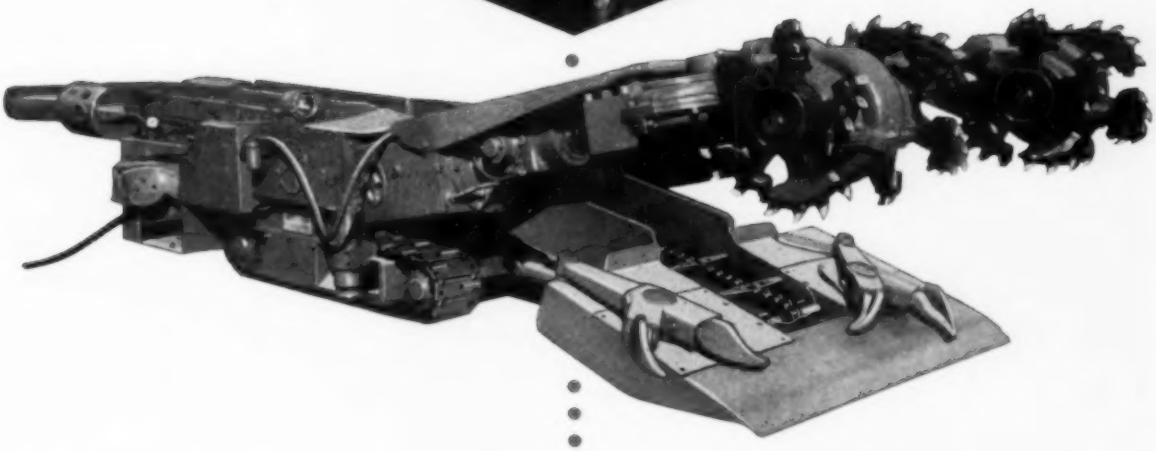
Auger, Undercutting Bits

Two new carbide-tipped coal-mining tools have been added to the standard line of mining tools offered by Carboloy Dept., General Electric Co., Detroit, Mich. One of the tools is a medium duty undercutter bit with stop and has been labeled the CCS-1. The other, a coal recovery auger bit, is the CCA-1. The undercutter bit has been designed for use on shortwall and universal cutting machines. It is similar to Carboloy's CC-1 tool, but differs by the addition of a stop that automatically sets the gage of the tool. The auger bit has been designed for coal recovery augers, but may be used on certain cutting machine applications. Both feature heat-treated steel shanks.

Iron-Coated Arc Electrode

"Rocket LH," a low hydrogen arc welding electrode, is being manufactured by Hobart Bros. Co., Hobart Square, Troy, Ohio. A new formula and the use of iron powder in the coating enables "Rocket LH" to be used for welding in

8 important REASONS why you should choose the Lee-Norse MINER



1. The Lee-Norse Miner cuts and loads coal at a rate of 2 to 3 tons per minute.
2. The Lee-Norse Miner is the only machine that cuts continuously a "DIAMOND PATTERN" in the face of the coal. This new and unique method of cutting coal produces "Coarse Cuttings" and less fines.
3. The Lee-Norse Miner is built like a modern Coal Loading Machine with improved "DUAL" gathering arms and flexible conveyor and with the exclusive Lee-Norse Cutter Head, which cuts from the roof down to the floor and gathers all the coal as it is cut.
4. The Lee-Norse Miner operates with the same electric power, now provided for conventional mechanical mining—No need for larger power facilities.
5. The Lee-Norse Miner, built like a flexible, mobile loader, has excellent clean-up . . . no need for auxiliary loading machine.
6. The Lee-Norse Miner is designed for easy maintenance. All gear drives, electric motors and hydraulic pump and motors are located on the outside, where they can be attended to quickly. No swinging head or turntable -no chain drive-makes for less maintenance.
7. The Lee-Norse Miner has "Low Bit Cost" due to the solid mounting of cutter bits and unique method of cutting coal.
8. The Lee-Norse Miner is well proportioned in size and weight to suit present day mining conditions. With simple control and high tramming speed it operates and moves like a modern mobile loader and not like a semi-stationary miner.

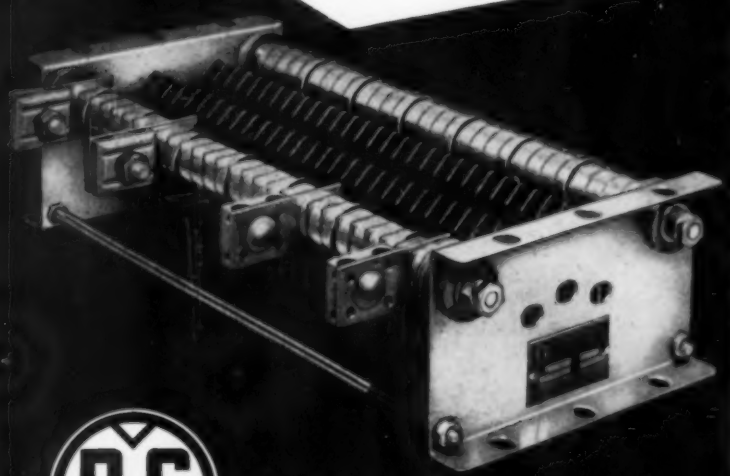
Write today for literature:

Lee-Norse Company

CHARLEROI, PA.

Specialists in Coal Mining Equipment

There is a *difference* in Resistors



P-G Resistors have proved this for many years

Different, because steel and mica, both extremely durable materials, coupled with P-G exclusive design produce a resistor of great mechanical strength. There is nothing to break. With accurate resistance values and adequate carrying capacities, P-G Resistors outlast ordinary resistors. Tell us your specifications and let P-G solve your resistor problem.

For any job . . . Where constant "trouble free" resistor service is wanted . . . you can safely specify P-G Steel Grid Resistors and get better performance with low cost maintenance.

The Nonbreakable Steel Grid Resistor

P-G

THE POST-GLOVER ELECTRIC COMPANY

ESTABLISHED 1902

221 WEST THIRD STREET, CINCINNATI 2, OHIO

all positions. At the same time, it gives more deposited weld metal with a smooth, uniform bead, according to the company. The powdered iron improves the stability of the arc and minimizes shorting out, the company says, adding that the iron powder also eliminates porosity resulting from starting and restarting the arc. The use of higher welding currents with either AC or DC also is made possible by the addition of powdered iron, the company claims.

Crane Rating 35 Tons

Marion Power Shovel Co., Marion, Ohio, has introduced the Model 43-MR, a 35-ton rubber-mounted truck crane designed for several types of crane work, according to the company. Features: dual front axles for weight distribution; power-removable counterweight to prepare the 43-MR for highway travel; 180-in wheelbase; and ability to carry its maximum rated load, with outriggers, at a radius of 15 ft.

Tire Treated for Cracking

A tubeless truck tire treated with a special "X-99" tread compound has been announced by the B. F. Goodrich Co., Tire & Equipment Div. Named "Power Express," the tire is available for original equipment or replacement use. The "X-99" compound is said to help prevent tread cracking and checking. The tire, when mounted on a new drop-center rim assembly, results in an over-all weight reduction of approximately 40 lb per wheel on some popular sizes, according to Goodrich. The company also says that since heat generated by a tubeless tire is less than heat generated by a conventional tire and tube of equivalent carrying capacity, the "Power Express" tubeless tire runs cooler. Available to cover the load capacity ranges of tire sizes previously covered by conventional truck tires in sizes from 6.00-16 6-ply to 11.00-24 12-ply.

Equipment Shorts

BURNS TREATMENT — Bullard's F.O.B., an antiseptic, anesthetic solution stored in a pressurized can, is said by the manufacturer, E. P. Bullard Co., 275 8th St., San Francisco, Cal., to be a complete first-aid treatment for burns. The solution is non-toxic and non-irritating, the maker says, and contains no harmful drugs. It is recommended by Bullard for burns caused by fire, electricity, scalding or sun.

Free Bulletins

TUBELESS TIRE CARE—A review of servicing and repairing tubeless truck tires is contained in a booklet, "All You Need to Know About Tubeless Tires for Trucks," published by The B. F. Goodrich Co., Tire & Equipment Div., Akron,

acf

"Load Support"

MINE CAR WHEELS





Cross Section of ACF "Load Support" Mine Car Wheel showing: (1) uniform depth of hardening, (2) extra heavy overhang, and (3) support at center of tread.

Cost you less per tonnage-mile

New acf "Load Support" Mine Car Wheels are perfectly round when you install them . . . and *stay round* after long, grueling service! Treads are QUICK CHILLED into a hard, abrasive-resistant surface and then GROUND CONCENTRIC TO THE AXLE to prevent "flats" and "load lifting". And because new type curved plates give treads FULL SUPPORT AT CENTER OF LOADING, tread "splitting" is practically eliminated. Overhang "break-offs" are eliminated also, due to extra metal reinforcement.

Although costs are competitive with ordinary wheels, New "Load Support" Mine Car Wheels result in fewer replacements . . . fewer work stoppages . . . long-lasting "roundness" that takes less power. They are available in 12", 14" and 16" sizes. These new wheels can really save you money . . . just like *any* acf replacement part for your mine cars. Get the latest facts from your nearby

AMERICAN CAR AND FOUNDRY DIVISION, acf Industries, Incorporated. *Sales Offices:* New York · Chicago St. Louis · Cleveland · Washington · Philadelphia · San Francisco. *Plants:* Berwick, Pa. · Milton, Pa. · Huntington, W. Va. · St. Louis, Mo. · St. Charles, Mo.

acf **MINE CARS**

for Constant Haulage

Ohio. The booklet is designed to acquaint fleet operators and dealers with the tubeless tire to improve trucking efficiency.

PLASTIC PAINT—A catalog describing "Seal-Kote" vinyl-plastic all-purpose paint has been issued by the Wooster Sealkote Co., Wooster, Ohio. The company recommends the paint for a wide range of applications in industry. According to the bulletin, "Seal-Kote" can be applied on either wet or dry surfaces, inside or out. When used on damp masonry, it is said to prevent further water penetration. According to the company, the paint has been formulated to permit free and constant "breathing" through its plastic film to release internal moisture. The manufacturer says it can be washed, and is non-yellowing, non-cracking and non-fading. Bulletin LL-2421.

ELECTRIC MOTORS—"The New L. A. Line of Electric Motors," a bulletin being distributed by The Louis Allis Co., Milwaukee 7, Wis., describes open drip-proof, as well as enclosed and explosion-proof, electric motors manufactured by the company to new NEMA standards. Also featured are special motors to meet variations of industrial requirements.

WIRE ROPE, CHAIN FITTINGS—A complete line of fittings for wire rope and chain is shown in a catalog issued by the Thomas Laughlin Div., American Hoist & Derrick Co., St. Paul 1, Minn. Information includes dimensions and safety factors for links, rings, shackles, swivels, hooks, turnbuckles, thimbles, clips, sockets, ring bolts, eyes and load binders. Catalog 950-1.

HOSES AND DUCTS—Bulletin 60, produced by The Flexaust Co., 100 Park Ave., New York 17, N. Y., provides information and prices on "Flexaust" hoses and "Portovent" ducts. The hoses and ducts are manufactured for moving air, dust, fumes and materials via pressure, suction or gravity. Methods of cutting, coupling, connecting, suspending and adapting the hose and ducts are illustrated.

WIRE-ROPE FILM—A 16-mm sound film, "Lifeline," tells a story of wire and wire rope manufacturing. It is being distributed by the Macwhyte Co., public relations manager, Kenosha, Wis. The film opens by showing the use of wire rope in industry, then follows with a step-by-step tour of Macwhyte's wire and rope manufacturing mills in Kenosha. Black and white, 21 min, no cost.

PORTABLE CRUSHERS—The Denver Equipment Co. has published Bulletin C12-B16 on Denver Type "J" portable and semiportable crushing plants. The plants are self-contained units that can be moved to any crushing job and made ready in a short time, according to the bulletin. Both units are equipped with Type "J" forced feed jaw crushers and apron feeders. Jaw crushers are equipped with anti-friction bearings, welded steel frames and manganese steel wearing parts. Two other mobile units, the Type "J" portable crushing unit and the company's trailer crushers are also described. Denver Equipment Co., P. O. Box 5268, Denver 17, Colo.

CRAWLER-TRACTOR — Technical and operating explanations of the Allis-Chalmers 45-drawbar-hp HD-6 Diesel-powered crawler tractor are available in Catalog MS-461, Construction Machinery Div., Tractor Group, Milwaukee, Wis. Engineering, design and performance features of the HD-6 are given. The catalog also lists matched equipment and accessories engineered to the HD-6.

TACHOMETERS—Bulletin 105, being distributed by the Metron Instrument Co., 432 Lincoln St., Denver 3, Colo., describes the company's stationary tachometers. The instruments are said to have an increased life because Metron has designed new circuits and new take-off heads. According to the bulletin, the

MORE NOLAN PORTA-FEEDERS
Now In Use Than All Other Makes Combined!

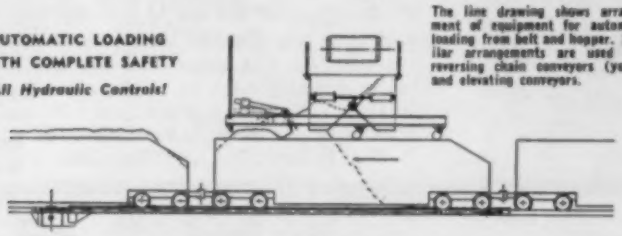
TWO MODELS:

1. Direct Mechanical Drive
2. Hydraulic Cylinder Type Hose Coupled to Remote Power Unit (Shown in illustration at right)



These two Nolan models will help you meet every requirement and condition in spotting cars for loading . . . *and can save you many shift hours per day!* The Porta-Feeder mounts between the rails on top of the track ties, and is secured by rail clamps. No excavation or preliminary foundation work is necessary. There are no ropes or cables. Reciprocating pushing dogs deliver constant forward feeding motion.

AUTOMATIC LOADING WITH COMPLETE SAFETY
All Hydraulic Controls!



The line drawing shows arrangement of equipment for automatic loading from belt and hopper. Similar arrangements are used with reversing chain conveyors (yoyos) and elevating conveyors.

The Nolan Porta-Feeder has been in successful use in many mines for over ten years. This modern method of moving cars has been accepted as the most efficient in the industry. Its ease of installation and quick movability recommends its use in any mine.

We will be glad to show you a mine in your vicinity where the Nolan Porta-Feeder is operating. Write us now.

NOLAN

THE NOLAN COMPANY
106 Pennsylvania St. • Bowerston, Ohio



G-E Mine Locomotives Increase Output 1125 Tons a Day for Christopher Coal

At Christopher Coal Company's mines in Pursglove, West Virginia, four General Electric 50-ton high-speed haulage locomotives have increased output by 1125 tons of coal daily. The four G-E 50-tonners replace the equivalent of eight 27-tonners of the type previously used. One 50-ton unit hauls out 25 tons more coal per trip than two of the 27-ton locomotives operating in tandem. And, maintenance has been so markedly reduced that four skilled men have been released for other important jobs.

Christopher Coal gets higher production because their G-E mine haulage locomotives are specifically designed for high-speed, heavy-duty operation. They carry heavier loads faster, requiring fewer locomotives, trains and crews. They reduce haulageway congestion and production delays, and simplify despatching. Their four-axle, swivel-truck design results in smooth riding with reduced wear. Less wear has effectively cut Christopher's maintenance costs.

WHAT ARE YOUR HAULAGE REQUIREMENTS? From the wide range of G-E industrial and mine locomotives—diesel-electric and electric, for both underground and surface haulage—there is one fitted to your needs. For a survey of your haulage requirements, without cost or obligation, call your G-E Apparatus Sales Engineer, Locomotive & Car Equipment Dept., General Electric Company, Erie, Pa. 120-80

GENERAL ELECTRIC

CONTINUOUS CENTRIFUGAL

means

1 BETTER COAL DRYING

. . . so much better, in fact, that C-M-I Dryers are piling up new records for economy and efficiency in preliminary dewatering operations.

. . . so much better that C-M-I Dryers are not only replacing costly heat drying in preliminary dewatering but, in many cases, are eliminating entirely the need for heat drying.

2 BETTER SLURRY RECOVERY

Marketable coal—thousands of tons of it—is being reclaimed from slurry by C-M-I Continuous Coal Dryers Dryers . . . at a cost so low as to make this operation extremely profitable. Yes—slurry reclamation CAN be profitable—when done the C-M-I way. Find out HOW and WHY...

SEND FOR FREE BROCHURE



C-M-I Centrifugal DRYERS

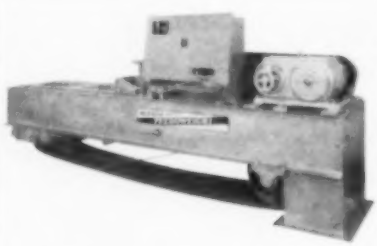
CENTRIFUGAL & MECHANICAL INDUSTRIES, INC.
146 PRESIDENT ST.
ST. LOUIS 18, MO.

tachometers contain no brushes, slip rings or similar parts demanding regular maintenance. Hundreds of combinations are available, the company says.

ELECTRIC WELDER—A bulletin being distributed by Lincoln Electric Co., Cleveland 17, Ohio, describes "Idealarc," an electric welder designed to produce four types of arc (AC: "soft or forceful"; DC: "soft or forceful"). How the machine gives the user selective arc control is explained. Typical applications are included. Bulletin 1343.

POWER UNIT—Catalog MS-455 explains the design, engineering and performance of the 4-cylinder, 60 hp Allis-Chalmers W-226 power unit. Specifications, cutaway views and photographs of a fan to flywheel unit, an open-style unit and a standard unit are included. Tractor Group, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

REFRACTORY SPECIALTIES — The Ramtite Co., Div. of the S. Obermayer Co., 2583 W. 18th St., Chicago 8, Ill., has issued a catalog describing plastic and castable refractories, cements and mortars from packaging to completed installation. It also outlines applications in various types of furnaces, and includes typical applications and suggestions for using plastics, cements and mortars.



Yes-feed by weight

with the MERRICK FEEDOWEIGHT, a self-contained automatic conveyor scale, with automatic gate for feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Uniformly feeds bulk material BY WEIGHT; automatically totalizes weight of materials fed. Simple to operate. Slow moving parts mean long life. Easy to install, maintain.

Manufacturers of

The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveyor operation. Complete descriptive matter on request.

MERRICK SCALE MFG. CO.
Engineers and Mfrs. of Automatic Weighing Equipment
PASSAIC, N. J.

MOTOR GENERATOR SETS — Large pedestal-mounted synchronous motor-generator sets suitable for mine hoists are described in a bulletin printed by Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis. Units covered are available in standard 2-machine sets (200- to 3,500-kw output, 125, 250 or 600 v DC), standard 3-machine sets (300- to 7,000-kw output, 125, 250 or 600 v DC) and in special combinations to meet special requirements. The bulletin describes the "Frog-Leg" armature winding and shows typical motor-generator sets. Bulletin 05B8175.

FILM ON CABLE—A 16-mm sound and color print of "Cable Makers," a film produced to tell the story of the people who manufacture cable, is being loaned free by the Rome Cable Corp. The film (21 min) is a companion to an earlier film, "Cable . . . Pathway of Power," also produced by the company. Advertising Dept., Rome Cable Corp., Rome, N. Y.

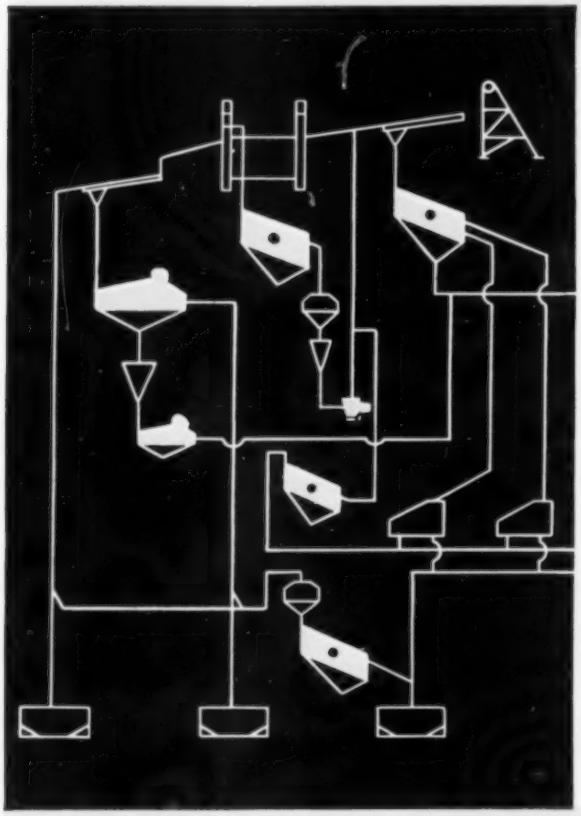
GRATINGS, STAIR TREADS—An illustrated brochure on the use of steel, aluminum and stainless grating and stair treads has been printed by the Klemp Metal Grating Corp., 6601 S. Melvina Ave., Chicago 38, Ill. The brochure describes various types of electro-forged welded grating, as well as riveted grating. Bridge-decking is explained and various types of anchors are suggested for grating installations. A table lists safe loads. Dept. SP.

BULLDOZER—The application and the operation of the rubber-tired Michigan Model 180 "Turbo-Dozer" are explained in a booklet being distributed by Clark Equipment Co., Construction Machinery Div., P. O. Box 599, Benton Harbor, Mich. Hydraulic controls, capacities, tilt and speeds are described. Engine, power-train, and hydraulic-system specifications are also listed. The "Turbo-Dozer" is powered by a turbocharged diesel and features a power-shift transmission, a heavy-duty torque converter, 4-wheel drive and rear-wheel steering.

CONTINUOUS MINER WITH ROOF DRILLS—Bulletin J-404 describing the Joy 1CM-2B continuous miner with integral roof-bolting drills is being offered by the Joy Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa. A modified version of the standard 1-CM miner that has produced 831 tons and more during a shift, the new miner is equipped with two RDU-2 hydraulic-rotary roof-bolting drills, one on each side of the machine, according to the bulletin. A pivotal mount on the crawler frame designed for maximum torque and penetration of the drills is also described. Features include descriptions of an instant control, without a gear shift, of infinite combinations of thrusts to 5,420 at 1,200 psi. The miner with roof drills is 45 in high, 117 in wide and 28 ft 8½ in long. It sumps 42 in wide and 18 in deep, and is powered by 271 hp. Capacity is 4 tpm.

FOR Profitable COAL PREPARATION

ALLIS-CHALMERS Vibrating SCREENS



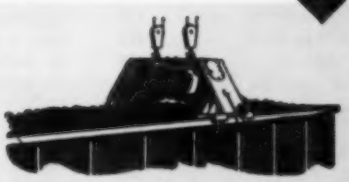
- for sizing ROM coal.
- for dry sizing raw coal ahead of cleaning units.
- for sizing and dewatering coarse coal after cleaning units.
- for sizing moist fine coal.
- for wet sizing raw coal ahead of cleaning units.
- for dewatering refuse after cleaning units.
- for media recovery after heavy media cleaning units.
- for dewatering fine coal after cleaning units.
- for sizing washed and crushed coal.
- for dewatering sludge — solids recovery.
- for sizing fine coal after dry cleaning units.

More Allis-Chalmers vibrating screens are used in the coal industry than any other make! Operators find it *profitable* to specify screens from the broad range of types and sizes offered by Allis-Chalmers because they can match the screen to the job. All of these screens have been specifically engineered for a special job in coal preparation. Be sure to send for new Vibrating Screen Selection Guide, Bulletin 25C6280E. Get it from your Allis-Chalmers representative in your area or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

With the Allis-Chalmers Car Shaker, you can ... unload a hopper bottom car of coal in as little as two minutes ... resulting in big savings in man-hours and unloading costs. Motor and drive are totally enclosed within shaker body, protected from damage and weather. Send for Bulletin 07B7221.

A-4261



NEWS ROUND-UP

Railroads, NCA Clash In Freight Rate Fight

As the rest of the nation was cashing, banking and spending the dividends of 1955's boom the country's railroads, despite earnings of 5 billion (net profit $915 million), were asking nearly woefully "What boom?" Although the $915 million was a record, topping 1953's $903 million, the railroads said the return was only 4.3% of their property investment. Moving to raise this figure in 1956, close to 500 rail companies petitioned the Interstate Commerce Commission for a 7% rate boost, then followed the petition with a request for the ICC to sidetrack usual procedure and make the increase effective Feb. 9. (Ordinarily a year or more might elapse before the carriers could collect a higher rate.) The railroads said they would make refunds to their customers if any part of the 7% were not permitted in later deliberations. Meanwhile, they were asking the ICC to grant the rise now and deliberate later.

The first protests came from the National Coal Association and from four meat packing companies. The NCA said the shortcut action would deprive the NCA of its "right to be heard and other due process of law." The meat packers claimed the procedure was unlawful.

The next day (Dec. 29) the ICC issued an order approving the shortcut to accelerate adoption of the higher rates. But it ordered an effective date of Feb. 25 instead of Feb. 9. It gave opponents of the increase until Feb. 3 to submit verified statements in opposition, then gave the railroads until Feb. 10 to submit replies to opposition statements. Beginning Feb. 13, the ICC ruled, it will hold hearings during which both sides will be heard. It promised each a chance for cross-examination. After the hearings, the ICC will decide, it said, whether to block or modify the increase.

Angrily, the NCA rapped the rail action, charging that coal traffic is being forced to subsidize railroad passenger deficits. It forecast an $85 million increase for coal consumers if the 7% rate were granted. Tom Pickett, executive vice president of the NCA, called on the railroads to end passenger deficit operations which, he said, were being financed by coal and other freight. Turning to the ICC, the NCA asked the commission to give bituminous coal a separate hearing. The NCA said: "to make possible a just ascertainment of the increase that should be applied to coal, if any, justice requires that the portion of the procedure dealing with the coal traffic be separated from the general proceedings." The petition asked that the ICC require certain railroads to furnish cost data pertaining to coal traffic. In an 11-page reply (Jan. 4) the railroads denied that coal should be given separate consideration.

By Jan. 15 the NCA's board of directors had whipped up a resolution reaffirming its opposition. It pointed out that President Eisenhower's Cabinet Committee on Energy Resources and Supplies had urged a reduction in 1955 on coal freight rates. The NCA board also said that the Cabinet Committee had called for the railroads to reduce coal freight rates voluntarily or for the ICC to reduce them by a compulsory order. Well past mid month (January) both sides, the NCA and the railroads, were awaiting the February hearings scheduled by the ICC. A bitter contest was shaping up.

In This Section

News Briefs	123
Foreign News	126
Preparation Facilities	130
Equipment Approvals	132
Personal Notes	134
Association Activities	136
Obituaries	139
Books For Coal Men	140
Among The Manufacturers	143
Meetings	146

Rep. Saylor Charges AEC With Hiding Atom Costs

Rep. John P. Saylor (R-Pa.) has charged that the Atomic Energy Commission is underrating coal reserves and concealing the costs of atom-power in the AEC's "headlong drive" to produce electricity from fissionable matter. Writing for Public Utilities Fortnightly, Rep Saylor says that AEC promises to generate "cheap electricity" are misrepresentations. "The cost of producing electricity in modern steam plants is already far below the target set by proponents of the A-power program," Rep. Saylor asserts. In the article he attacks reports which he says are designed to imply that production of electricity by atomic reactors must be expedited because conventional fuels supplies are diminishing. He declares that such reports can be refuted by referring to authentic coal reserve tables. Rep. Saylor calls for the AEC to disclose the costs of developing atomic electricity. "The general public," he said, "should demand dissemination of actual cost information," except where publication would endanger national security.

Bituminous Output

YEAR TO DATE	PRODUCTION
Jan. 14, 1956	19,870,000
Jan. 15, 1955	17,216,000

Anthracite Output

YEAR TO DATE	PRODUCTION
Jan. 14, 1956	1,074,000
Jan. 15, 1955	1,041,000

West Virginia Forms First Statewide Safety Group

West Virginia has become the first in the United States to form a state-wide council of the Holmes Safety Association. At a December organizational meeting in Charleston, W. Va., Julius C. Olzer, chief of the State Department of Mines, was elected first president by nearly 50 representatives of labor, management and federal and state inspection agencies. These men also were elected to fill posts in the new organization: George J. Titler, Beckley, W. Va., UMWA Dist. 29 president, first vice-president; R. E. Salvati, Huntington, Island Creek Coal Co. president, second vice-president; G. R. Higinbotham, Fairmont, Consolidation Coal Co. (W. Va.) president, third vice-president; C. J. Urbaniak, Fairmont, UMWA Dist. 31 president, fourth vice-president; Harry A. Quenon, Mt. Hope, Eastern Gas & Fuel Associates division manager, fifth vice-president; C. R. Bourland, Mt. Hope, New River Co. president, sixth vice-president; C. M. Hoard, Barracksville, Bethlehem Mines Corp. division superintendent, seventh vice-president; Woods G. Talman, Gary, U. S. Steel Corp., district superintendent, eighth vice-president; Joe L. McQuade, Richwood, ninth vice-president; W. R. Park, Mt. Hope, U. S. Bureau of Mines district supervisor, secretary; and Raymond O. Lewis, Charleston, UMWA Dist. 17 president, treasurer.

15 Million-Ton Expansion Planned By Steelmakers

A record peacetime build-up of steel production—15,000,000 tons in 3 yr—is planned by the nation's steelmakers. The build-up will be accomplished at the rate



For HEAVY DUTY

MONARCH **WHYTE** STRAND

Wire Rope by MACWHYTE

MONARCH WHYTE STRAND Wire Rope is at home on today's fast, high-output equipment where heavy duty performance means savings.

There is a correct MONARCH WHYTE STRAND size and construction for all mining needs. Give it an opportunity to serve you—you will be more than pleased with its performance.

Prompt shipment from stock can be made by Macwhyte distributors.

MACWHYTE COMPANY, 2931 Fourteenth Avenue, Kenosha Wisconsin

Manufacturers of wire rope to meet the needs of all equipment: Internally Lubricated Wire Rope, PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cable and Assemblies, Monel Metal, Stainless Steel, and Plastic Coated Wire Rope, and Wire Rope Assemblies.

MILL DEPOTS

New York 4, 35 Water St.
Pittsburgh 19, 704 Second Ave.
Chicago 6, 228 So. Desplaines St.
St. Paul 14, 2356 Hampden Ave.
Ft. Worth 1, P. O. Box 605
Portland 9, 1603 N. W. 14th Ave.
Seattle 4, 87 Holgate St.
San Francisco 7, 188 King St.
Los Angeles 21, 2035 Sacramento

General Wire Rope Catalog G-16 available on request.

1086



MACWHYTE WIRE ROPE

of some 5,000,000 tons each year and advance steel-making capacity from some 128,363,000 tons to 143,363,000 tons annually.

Plans for the huge tonnage increase were disclosed last month (Jan. 16) by Benjamin F. Fairless, president of the American Iron & Steel Institute, whose members represent 93% of the country's steel production. A survey among the institute's members provided the projections.

Steel companies plan to spend $1,200,000,000 in 1956 alone on the expansion. "Billions of dollars more must be spent for the new expansion over the next three years," according to Mr. Fairless. He forsees even more expansion after the 3-yr program has been completed.

In the past ten years steel has stepped up production at a rate of 3,500,000 tons a year. Only in the years 1952 through 1954 did production expand faster. In that period capacity rose by 17,000,000 tons, some of it, however, because of the Korean War emergency.

For coal, the latest steel expansion move was, of course, the best news of the new New Year. Each new ton of steel, obviously, would mean another ton of coal to be mined, most of it by steel's own captive coal mines. Annual coal use for steel seemed slated to increase solidly 5,000,000 tons in each year during the next three.

Harold Davis Appointed Coal Age Managing Editor

Effective Jan. 1, Harold Davis assumed the duties of managing editor of *Coal Age*, succeeding W. H. McNeal, who was recently promoted to the position of manager of research for *Coal Age* and *Engineering and Mining Journal*. Mr. Davis joined the editorial staff as assistant editor in August, 1949, and was made associate editor in September, 1953. Prior to joining *Coal Age*, Mr. Davis was assistant supervisor of mining extension at Pennsylvania State University. He is a graduate of Penn State with a Bachelor of Science degree in mining engineering, and was employed by The Hudson Coal Co., Scranton, Pa., for 3 yr before entering college.

Textile Court Ruling May Influence Coal Wage Fight

Although more than 350 Virginia and Pennsylvania coal operators succeeded in getting an injunction temporarily blocking Secretary of Labor James P. Mitchell's order for an industry-wide minimum wage for miners (*Coal Age*, January 1956 p 112), the operators are heading for their first setback if a U. S. District Court, District of Columbia, follows the lead of a U. S. Court of Appeals. In December the appeals court ruled against manufacturers of another industry—textiles—and their fight to block an industry-wide minimum wage. The court said that Secretary Mitchell has the authority to determine prevailing minimum wages on a nationwide basis for industries working on government contracts.

The secretary had ordered a $1 minimum for textile workers. In court the manufacturers had argued that Secretary Mitchell could order only separate, local wage minimums based on wages prevailing in each "locality," and that the Walsh-Healy legislation, under which Secretary Mitchell had acted, did not permit sweeping, industry-wide wage orders. The court, however, in a majority opinion (2-1) disagreed, then upheld Mr. Mitchell's contention that where competition is industry-wide, a minimum wage determination on any narrower basis would "freeze the competitive advantage of concerns that operate in low wage communities." The Secretary has recommended a $2.25 coal wage minimum in Virginia and Pennsylvania.



Anthracite Industry Joins "Operation Home Improvement"

The anthracite industry launched a cooperative drive last month in conjunction with the "Operation Home Improvement" (OPHI) campaign sponsored by the U. S. Chamber of Commerce. The Anthracite Industry Council kicked off the drive with an industry heating exhibit in Jersey City, N. J. Jan. 16, opening day of the year-long OPHI program. For the rest of the year, the council said, it planned Anthracade appearances, more exhibits and direct advertising to tie in the anthracite industry with the Chamber of Commerce program. Then last month, after designing a special "Operation Home Improvement" emblem, the council contacted thousands of coal retailers and urged them to join in the effort to show home owners methods by which they could improve the appearance and convenience of hand-fired heaters, as well as install automatic anthracite burners and year-round air conditioning.

Gas Sales Boost Granted Transcontinental By FPC

The full Federal Power Commission has backed an FPC examiner's recommendation (*Coal Age*, December, 1955, p 126) to authorize Transcontinental Gas Pipe Line Corp., Houston, Tex., to sell natural gas at a rate of 50,000,000 cu ft a day to Duke Power Co., Williamston, S. C. The decision boosted Transcontinental's maximum sales to Duke from 30,000,000 cu ft a day. The FPC turned back opposition from the coal industry, labor representatives, and rail executives with the opinion that "claimed disadvantages to coal, transportation and labor interests have not been established and that assuming their existence, any such disadvantages are outweighed by the public benefits which will accrue from the proposed sale" of natural gas.

Bigger Profits Pie Shared By Pittston Coal Investors

Last year's improved coal profits began to show up in some stockholders' dividend checks last month as the Pittston Co. announced it would cut up a bigger financial pie for its investors. The company increased its quarterly dividend on common stock from 25c to 35c and ordered a year-end extra stock dividend of 5%. A subsidiary of Pittston, Clinchfield Coal Co., also had some good news for its investors. It doubled its usual quarterly dividend of 25c to 50c and declared an extra dividend of 50c. Clinchfield announced that an improved outlook for profits in coal and stable income from natural gas deposits it owns permitted the boosted dividend payments.

New Ohio River Plants Serve A-Power Project

The second largest power plant ever constructed by private enterprise has begun operating at full capacity (1,075,000 kw) on the Ohio River near Cheshire, Ohio. The plant is the Kyger Creek operation owned by the Ohio Valley Electric Corp. (OVEC). The fifth and last of Kyger Creek's 215,000-kw steam turbine generators was placed in operation in December, 3 yr after ground had been broken on the site. OVEC also is constructing what it says will be the world's largest private power plant, the Clifty Creek operation on the Ohio River, Madison, Ind. Five 215,000-kw steam turbine units are already in operation. A sixth and final unit is scheduled to be installed this month to give Clifty Creek a total capacity of 1,290,000 kw. Both Kyger Creek and Clifty Creek have been constructed to supply electric power for a U. S. Atomic Energy Commission project in Portsmouth, Ohio. Between them the plants capacity will be 2,365,000 kw.

Coal Sales Group Posts $1,000 Fuels Scholarship

A scholarship worth $1,000 a year to the holder, provided he maintains satisfactory grades, is being offered in the field of fuel technology at Pennsylvania State University by the American Coal Sales Association. The scholarship will be awarded to a freshman entering the university's fuel curriculum in September and will be renewed each year. The association announced that the scholarship is open to all high school graduates in the nation. The university's Department of Fuel Technology offers courses in solid combustion, chemistry of fuels, thermal processing, carbons, synthetic fuels, gasification, instrumentation and gaseous combustion. In a circular announcing the scholarship, the school points out that the "projected energy requirements for our nation in the next 50 yr are so tremendous that the expansion of fuel industries will continue at a high rate. Many fuel technologists will be required to guide gigantic multibillion dollar industries."

Oilman Wilson Predicts Rosy Future For Coal

Last month (Jan. 17) the board chairman of Standard Oil Co. (Ind.), Robert E. Wilson, said that coal will continue to be the main fuel for power stations in years to come despite atomic energy. Mr. Wilson said this at a meeting of the American Bankers Association credit conference. Atomic research, Mr. Wilson declared, "has uncovered almost as many new problems unsuspected in the early days of rosy optimism as it has fully solved the problems then recognized." He told the credit conference audience that experts had agreed that few unsubsidized atomic power plants will be built in the United States for commerical purposes within ten years.

News Briefs

A series of one-day field clinic meetings for coal burning equipment dealers is being sponsored by Automatic Solid Fuels Equipment, Inc. The first meeting is scheduled Mar. 1. Others will be held in 15 mid-western cities. The clinics have been devised to acquaint interested coal dealers with the Campbell coal burner manufactured by the Illinois Iron & Bolt Co. A final purpose of the clinics, according to Automatic Solid Fuels, is to distribute the knowledge necessary to sell, install and service modern coal-burning equipment.

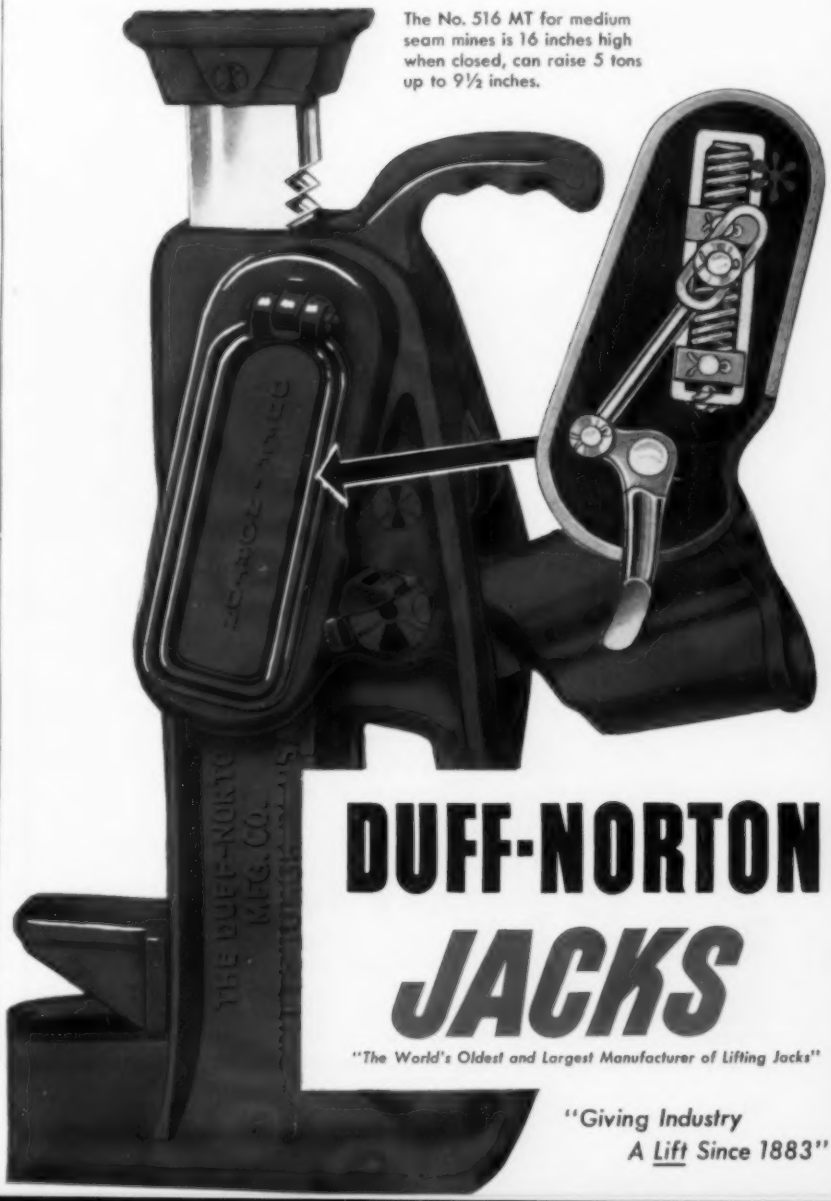
A 305,000 kw turbine generator has been ordered from General Electric in

Why This Special Mine Jack Will Give Longer, Trouble-Free Service

When Duff-Norton engineers set out to design safer, longer lasting jacks for men who work in and around coal mines, they discovered one startling fact—about 90% of jack maintenance was in replacing worn springs in the mechanism that controls the jack's raising or lowering action. Result? All Duff-Norton mining jacks are equipped with a patented,* adjustable spring mechanism which assures positive engagement of rack teeth. The spring's tension can be easily adjusted with a screw driver without removing any part of the jack. Should the spring eventually lose its resiliency, there's no need to send the jack to the repair shop. A new, complete spring mechanism assembly can be quickly installed by anyone in a matter of minutes, making the jack as good as new! In fact, as a special service, Duff-Norton distributors carry in stock extra spring mechanisms for all Duff-Norton ratchet lowering jacks.

Ask your local distributor or write the world's oldest and largest manufacturer of lifting jacks for a copy of *"A Handy Guide for Selecting Duff-Norton Mine Jacks."* This colorful, illustrated booklet is full of useful information about all kinds of jacks for coal men. Write for bulletin AD10-J to Duff-Norton Company, P.O. Box 1889, Pittsburgh 30, Pa.

The No. 516 MT for medium seam mines is 16 inches high when closed, can raise 5 tons up to 9½ inches.



DUFF-NORTON

JACKS

"The World's Oldest and Largest Manufacturer of Lifting Jacks"

"Giving Industry A Lift Since 1883"

TAKEDOWN VALVES

● **save maintenance time on your COAL WASHING installations**

Takedown Valves can be disassembled and reassembled in ONE minute, without tools . . . clogged water lines are quickly opened, there is no hunting for pipe wrenches.

● **long-lived**

● **positive, indicated flow control**

Machined from brass bar stock, Takedown Valves are slightly higher in cost than ordinary valves . . . a cost saved many times over by their exclusive takedown feature. Write for catalog sheet & detailed account of valves in use.

TIMESAVERS for INDUSTRY

6052 Manchester Road — Clinton, Ohio

Giving Coal The Shakes . . .



Now you can screen coal easier, faster and with less time out due to blinding. Here's the secret: Use Hendrick Perforated Plate on your vibrating and shaking screens. For Hendrick can often mean the difference between profit and loss in coal preparation. Hendrick Perforated Metal Plate stands up under continuous heavy-duty usage . . . screens last longer and openings remain uniform to assure accurate sizing. For information on the flat, corrugated or stepped shape and the size of perforation that is best suited to your particular needs, write to Hendrick today.

Hendrick
MANUFACTURING COMPANY
41 DUNDAFF STREET, CARBONDALE, PA.
Sales Offices in Principal Cities

PERFORATED METAL • PERFORATED METAL SCREENS • WEDGE-SLOT AND WEDGE WIRE • ARCHITECTURAL GRILLES • MITCO OPEN STEEL FLOORING • SHUR-SITE TREADS • ARMORGRIDS

Schenectady, N. Y. by the Commonwealth Edison Co., Chicago, Ill. The unit will serve the company's Waukegan generating station.

Ohio Edison Co. has announced it will build a 340,000 kw generating plant on the Ohio River near Stratton, Ohio. Construction will cost $62,000,000 and will begin next summer. The company will install two generating units, each 170,000 kw. The first unit is expected to begin operating in 1959. Officials say the new plant and others that are scheduled will increase capacity by 520,000 kw between 1957 and 1960.

Three 35,000-lb-per-hr boilers fired with spreader stokers are being installed in a Naval air station boiler house in Brunswick, Me. The Navy, applying the suggestions of the National Coal Association's engineering department, has equipped its plant with modern automatic coal and ash handling equipment, dust collectors, over-fire jets, full automatic controls and recording instruments. Standby oil equipment also is being installed.

Coal was again "King Coal" last month as far as the steamship charter market was concerned. Brokers reported that some 2,000,000 tons of coal contracts had been concluded for shipments extending as far into the future as 1958. A large number of coal-loaded ships had been chartered for single voyages at rates from $9.80 to $9.94 a ton.

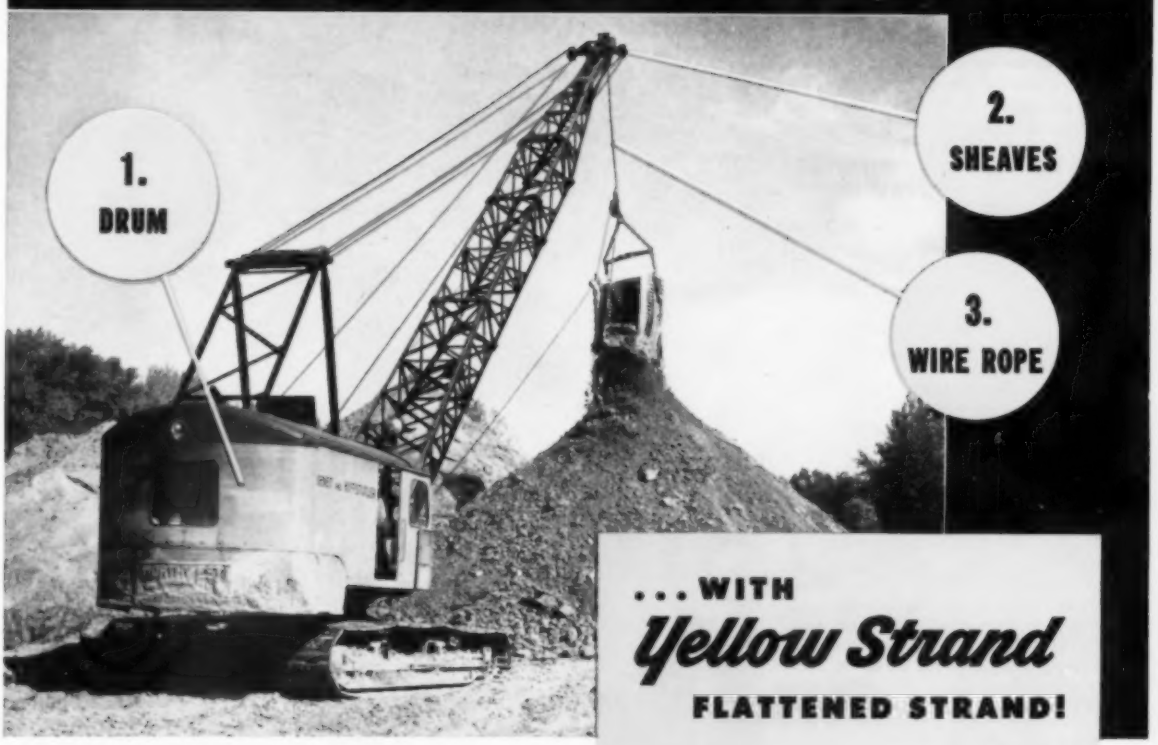
Kentucky planned a $55,000 look last month at what was called the "one-shot economy" of eastern Kentucky. By hiring Chicago's Armour Research Foundation of the Illinois Institute of Technology to do the looking, the state hoped to come up with answers that would alleviate eastern Kentucky's economic dependence on coal. Dr. Haldon A. Leedy, director of the foundation, said that the "purpose of the audit would be to determine the possibility of developing new industries which would lead to a more stable and prosperous economy."

The Christopher Coal Co., Osage, W. Va., a division of Pittsburgh Consolidation Coal Co., plans to reopen its Booth No. 6 mine, Edna, W. Va., after a 2-yr shutdown. The reopening is scheduled for March with preparatory work already under way. Charles R. Nailler, president, says the mine will employ 100 to 125 men and produce 2,000 to 2,500 tpd.

A West Virginia coal producer, Trotter Coal Co., disclosed last month that it is reopening its Louise Mine near Osage, W. Va. James F. Trotter, company president, said that the mine should be open within 30 days of the announcement (Jan. 6). Crews of men have been re-

(*Continued on p 146*)

STRIP MINERS GET BETTER PERFORMANCE, LONGER LIFE AT THESE 3 VITAL ZONES . . .



Genet and Huffstutler, strip miners, Beech Creek, Kentucky, no longer worry about the three most common wire rope problems — scored drums, corrugated sheaves and short-lived wire rope. Their dragline is now equipped with Yellow Strand Flattened Strand Wire Rope!

Yellow Strand Flattened Strand whips these problems because it's made of strands laid up in a triangular form (see illustration at right).

The outer contact surface is smoother to conform to the sheaves. You get 10% greater metallic area, a corresponding increase in strength, plus a compactness unobtainable in round strand construction. The greater contact area of Yellow Strand Flattened Strand means you get smoother running through sheaves, smoother spooling over drums. And because of its construction, Yellow Strand lasts longer—up to twice as long in many cases. So order Yellow Strand Flattened Strand from your Distributor the next time you stop in to see him.

COMPARE *Yellow Strand* FLATTENED STRAND



with ordinary wire rope (right). In Flattened Strand you have twelve contact points, greater contact area, smoother surface, less wear. Result: longer service, lower final cost!

Yellow Strand®

Manufacturers of Wire Rope for 80 Years

Broderick & Bascom Rope Co.

4203 Union Blvd., St. Louis 15, Mo.



American Logging Tool Corporation is a subsidiary of Broderick & Bascom Rope Co.

Foreign News

AUSTRALIA

For the first time anywhere, brown-coal coke has been successfully used to smelt iron commercially in an Australian foundry. The recent test was the climax of a 5-yr effort by the Brown Coal Research Laboratory at the University of Melbourne. The success will lead to the construction of a plant producing about 200 tons of coke daily. The brown-coal coke proved to have a higher mechanical strength than imported metallurgical coke. It was made from brown coal briquettes. The process consists of passing hot gases through a bed of briquettes and slowly raising their temperature to 850 C, then gradually cooling them. This shrinks the briquettes to just under half their normal size turning them into a fuel better than the best metallurgical coke. Meanwhile, the output of brown coal in Victoria (location of the world's biggest open-cut mine) is to be progressively increased. Output in 1958 will be 1,250,000 tons, rising to 5,300,000 tons in 1960, 12,300,000 tons in 1965, 18,100,000 tons in 1970 and over 20,000,000 tons in 1975.

New deposits of brown coal have been located at the edge of the Balook dome in Gippsland, Australia. The whole area will be drilled to prove the extent of the field. The coal is reported to be of very high quality.

GREAT BRITAIN

British coal export prices have been increased all around by between 30 and 40 shillings a ton, effective Jan. 1. One well-informed industrial source in Great Britain says "this will mean that the choice between British and American coal on the continent will now be very finely balanced." The new prices are being written into contracts for Denmark, Holland and other continental purchasers as they fall due. It is understood that the new contracts have a price review clause which will enable both sides to have a second look at the prices in March. This clause will also enable the contract to be cancelled if no further agreement on prices is possible.

AUSTRIA

Deposits of hard coal, so large that it is difficult to realize their vast extent, have been located east of the Dnieper River and west of the Volga River. It is claimed by a Vienna news service, "Montan-Dienst" (The Montanistic News Service) that these discoveries will now make possible a shift in Soviet coal supplies. So far, one metric ton of coal (2,204.6 lb) has been used by locomotives to bring 3 metric tons of coal to the western and highly industrialized regions of the U.S.S.R. Supply to these industrial centers was so bad during past years that even 20,000,000 metric tons of Polish coal imported each year did not bring worthwhile relief. The rapid and complete exploitation of the newly discovered deposits has been given priority in the new Five-Year Plan which began Jan. 1, 1956, and will end Dec. 31, 1960.

USSR

Russia has announced plans to use methane gas collected by special exhaust systems from coal mines in the Karaganda basin as fuel for heating workers' apartments. The newspaper Trud says that up to 80,000 cu meters of methane a day will be obtained from the mines for heating purposes by the end of the sixth Five Year Plan (1956-1960).

The U. S. S. R., herself depending on the annual import of at least 200,000 metric tons of Polish coal, has offered Austria an undisclosed amount of Soviet hard coal. The offer was accepted by Austria on Dec. 14, 1955. Signed in Moscow on that date, the Austro-Soviet Coal Delivery Agreement is a special part of the overall Austro-Soviet trade agreement. The newly founded "Donez



Brown Coal Strip Mine In Poland

As reports of increased activity in brown coal mining appeared last month in Europe and Australia, the Polish Embassy in Washington said that Poland was preparing to enlarge operations at its big open-pit brown-coal mine in Konin, a community of some 30,000 in central Poland. The mine began producing a year ago and is scheduled for increased production during the new Five-Year Plan begun last month. The mine's future task will be to supply a nearby power plant, according to the embassy, which did not release any production figures. The Konin mine's overburden is removed in benches (photo) by a bucket chain moving around a digging ladder (lower foreground). Exposed coal is loaded by power shovel into side dump cars (note track running alongside shovel). An electric haulage locomotive is visible on top of the highwall on the other side of the pit. Chains rather than wire rope (foreground) are used to raise and lower the digging ladder. Poland mined 94,000,000 tons (all ranks) in 1955.

This high-profit performer is now



BETTER THAN EVER

This versatile Caterpillar No. 12 Motor Grader is on the go five days a week on stripping operations at Seminole Coal Corporation's mine, Lenzburg, Ill. It maintains haul roads, cleans the top of the coal, and pushes and pulls loaded railroad cars to help Seminole maintain an average output of 5000 to 6000 tons a day. In addition to traditional Caterpillar ruggedness and freedom from down time, the No. 12 now has new features for even higher production and bigger profits for *you:*

NOW—TUBELESS TIRES. Available at no extra cost, tubeless tires on CAT* Motor Graders eliminate an estimated 80% of down time caused by tires. Tubeless tires are easier and quicker to mount, hold air longer, run cooler, and give better puncture and blowout protection.

MONEY-SAVING OIL CLUTCH. Specially bonded cork facings bathed in oil can give you 1500 hours without clutch adjustment. Facings wear an average of only 2½ thousandths of an inch per thousand hours of operating time. This means longer clutch life, easier maintenance, reduced down time.

Like all Caterpillar Motor Graders, the new No. 12 is built—not merely assembled—by a single manufacturer. Engine, blade capacity and working speed are carefully balanced for maximum efficiency. And skilled service and Caterpillar parts are quickly available from a single dependable source: your Caterpillar Dealer.

Your dealer will gladly demonstrate such high-production features as unexcelled operator visibility from the seat, quick-change blade positioning and positive, non-creep mechanical controls. He'll help you select the model—No. 12, No. 112 or No. 212—best suited to your needs. Call your Caterpillar Dealer today.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

99% OF ALL CAT MOTOR GRADERS ARE STILL IN USE



This Screen Guard can be used in any mining and industrial field and is particularly adaptable for use in flumes. Only the finer particles pass over the screen.

mining

foods

WEDGE WIRE PREPARATION SCREENS AND SCREEN GUARDS PERFORM WITH

top efficiency

chemicals

abrasives

oil

The trade name KLEENSLOT stands for high quality precision made screens, giving top performance and efficiency in screening, dewatering, washing, extracting, filtering, or sizing applications. They are made of specially formed wedge shaped wire to afford clear rapid passage of materials and to eliminate blinding. Highest production is the greatest feature of WEDGE WIRE products. Write for literature!



WEDGE WIRE Vibrator Screens can be designed to fit any make of vibrator.

Wedge-Wire CORPORATION
Gas Street at Nickle Plate R. R.
Wellington, Ohio

Import Coal Trade Co., Ltd.," a corporation in which several of Vienna's biggest coal dealers are united, signed the agreement on Austria's behalf. The first test shipments were to be received in Austria last month. These will consist of coking coal, gas coal and anthracite. Regular deliveries by rail are to begin this month or next.

The Soviet Union has announced that more than 2,000,000 metric tons of hard coal were mined during 1955 with the aid of the water-flush method. Water, injected under high pressure into the seams, then mixes with broken coal to form a mud that is pumped to the surface. The method is claimed by the Soviets to be the least expensive mining method. The fields in Siberia, Central Asia, in the Moscow region and in the Kusnezk coal basin are operated this way. The Soviets say that the use of water flush has proved successful, especially in open pit mining. Coal with a high ash content (low quality) can thus be utilized.

Russia plans to produce 390 million metric (2,204.6 lb) tons of coal this year, according to the Soviet economic journal, *Voprosy Ekonimiki*. The Soviets have also established output figures for other basic industries, among them steel (45 million metric tons), pig iron (33 million) and electricity (66 billion kwh).

ITALY

Shrinking markets from which she may buy coal have caused Italy to turn to the United States for new supplies. In the first 7 mo of 1955, according to returns supplied by Italian ministries, Italy bought 3,195,618 tons from the United States. This was an increase of 141.6% over a corresponding period in 1954 when the United States shipped 1,322,847 tons to Italy. Italy's heaviest reduction has come from West Germany which sent 1,706,780 tons in 1955, a drop of 428,525 tons under the 2,135,305 tons it shipped in 1954. Belgium, the Saar and Great Britain have also drastically cut shipments of coal to Italy. Among the countries that supplied larger quantities in 1955 are France, Yugoslavia, East Germany, Morocco and Russia.

FRANCE

A favorable outlook can be predicted for the French coal industry for a long time ahead, according to Pierre Cadel, president of the French Coal Board. Mr. Cadel compared the current bright situation with selling difficulties in 1954. To remedy that situation, the Board centered its efforts on the international market and has thus been able to cope with commercial difficulties and unemployment by increasing exports. Coal output in 1955

(*Continued on p 152*)

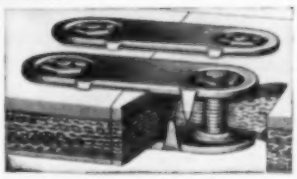
FLEXCO®

BELT FASTENERS and RIP PLATES



FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

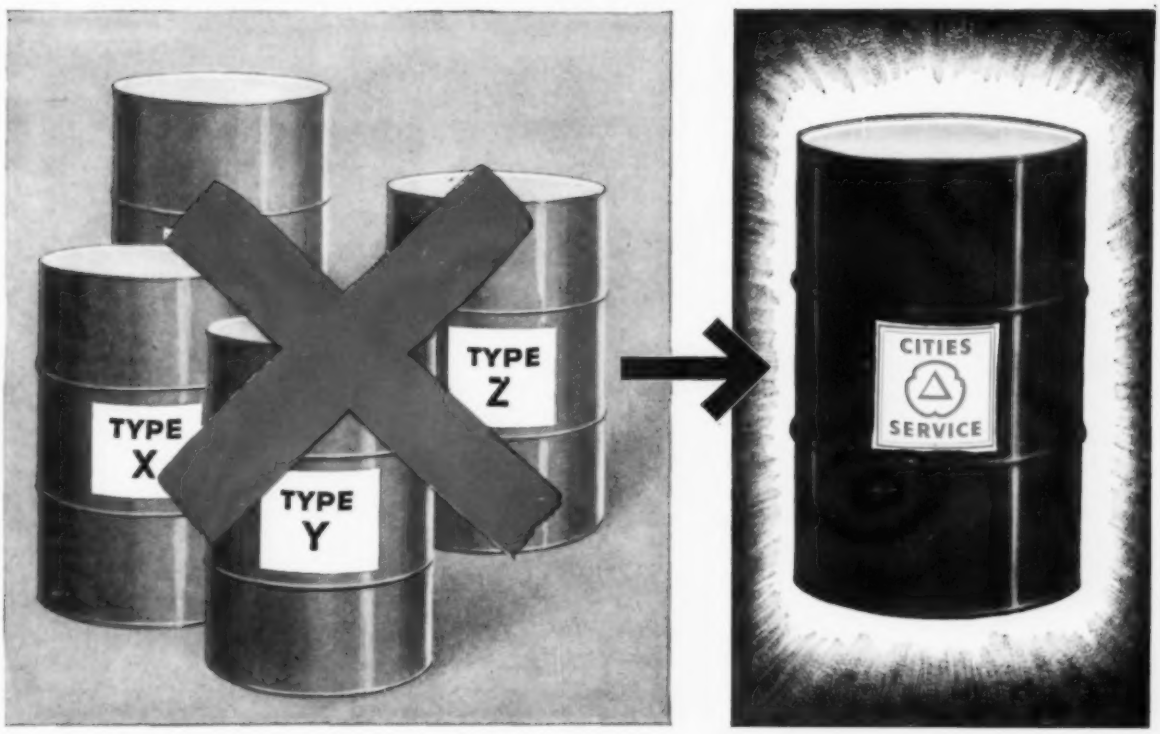
★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-112

FLEXIBLE STEEL LACING CO., 4638 Lexington St., Chicago 44, Ill.



NOW—ONE GREASE FOR ALL YOUR EQUIPMENT

New Multi-Purpose TROJAN H Grease!

Let Cities Service Multi-Purpose Trojan H Grease, the remarkable new lithium base lubricant, take on the job of practically all your present greases and do a better job than any special grease.

Used for all types of bearings, chassis lubrication, water pumps and conveyor systems, this one unmistakable "red" grease is ideal for everything from the smallest service truck to the largest shovel.

New Multi-Purpose Trojan H not only has greater stability than previous greases, it also pumps easier at low temperatures, flows easier, and has exceptional resistance to water, oxidation, and rust. Best of all, it lasts longer and tests show it takes *less* to do this superior job of lubrication. Result: You save time, confusion, and money!

For more information about this unusual multi-purpose grease, talk with your Cities Service representative. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

USE JUST ONE GREASE
and get all these benefits

- Simplified inventory
- No possibility of error in application
- Less grease consumption
- Easier dispensing
- Less lubrication time
- Better grease stability

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

$137 PER DAY
for the RIGHT
MANAGEMENT MAN



WHO WILL SAVE WITH
OSMOSE
TREATED TIES & TIMBERS

Yes, a saving of $137 per day is a big one . . . but entirely possible! If you deep mine 200,000 tons of coal annually, you can save your company $50,000 per year by using OSMOSE TREATED TIES AND TIMBERS. Comparable savings are possible for smaller or larger tonnages. Osmose Ties and Timbers are scientifically treated to resist all types of rot, decay, termites or whatever you prefer to call the wood-consuming action that can annually rob you of a small fortune. Mine timbers are expensive enough but compared to the cost of REPLACEMENT LABOR, today, their cost is trifling.

Osmose Treated Ties and Timbers LAST UP TO FIVE TIMES LONGER saving you both material and labor costs many, many times. No other timbers! No other treating process can surpass Osmose in mine effectiveness or approach Osmose in economy.

That's why the nation's leading coal mining companies substantiate our own natural enthusiasm. For instance The Pocahontas Fuel Company, Inc. says: "Our Company has been using Osmose Timber Treatment, at the various mines, since 1942. We feel that sufficient time has now elapsed to prove the worth of your Treatment, and are pleased to advise that it has been very satisfactory to us."

SEND FOR FREE BOOKLET

Write for fully illustrated booklet, "Force Down Your Operating Costs," that explains in detail all about Osmose Treated Ties and Timbers.



OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.
980 ELLICOTT STREET · BUFFALO 9, NEW YORK
Representatives in: Pittsburgh, Denver, Birmingham, Ala., Charleston, W. Va. and Harlan, Ky.
"Leading Manufacturers of Wood Treating Specialties"

Preparation Facilities

Eastern Gas & Fuel Associates, Eccles No. 5, Eccles, W. Va.—Contract closed with Fuel Process Co., So. Charleston, W. Va., for two 40-in Belknap coal washers with screening facilities to treat 4x¾ coal.

Blaschak Mining Co., Ringtown, Pa.—Contract closed with Wilmot Engineering Co., Hazleton, Pa., for one 2½-ft-diameter Wilmot cone cleaner for preparing barley coal. Feed capacity, 15 tph.

Coates Coal Co., Centralia, Pa.—Contract closed with Wilmot Engineering Co. for one 16-ft-diameter Wilmot classifier-cleaner for No. 5 coal. Feed capacity, 100 tph.

Jeddo Highland Coal Co., Jeddo No. 7 breaker, Harleigh, Pa.—Contract closed with Wilmot Engineering Co. for one 12-ft-diameter Wilmot froth classifier for preparing No. 5 and No. 6 anthracite, feed capacity, 65 tph; and for one 2½-ft-diameter Wilmot cone cleaner for preparing No. 4 coal, feed capacity, 12 tph.

Franklin Hydrotated Coal Co., Ravine, Pa.—Contract closed with Wilmot Engineering Co. for two Deister Diagonal Deck concentrating tables for preparing No. 4 and No. 5 anthracite. Total feed capacity, 16 tph.

Crichton Coal & Coke Co., Heshbon, Pa.—Contract closed with Wilmot Engineering Co. for one Wilmot-OCC heavy media vessel, Size No. 526 for preparing 6x¼ bituminous. Feed capacity, 100 tph.

Tunnel Ridge Coal Co., Tower City, Pa.—Contract closed with Wilmot Engineering Co. for one Wilmot heavy media system including one No. 528 Wilmot-OCC vessel for preparing stove, nut and pea anthracite. Feed capacity, 125 tph.

Peabody Coal Co., St. Louis, Mo.—Contract closed with McNally Pittsburg Mfg. Co. for reconstruction of 1,000-tph preparation and cleaning plant at Freeburg, Ill. New facilities provide for dual R-O-M feed for both underground and strip mines. Underground coal is stored in 5,000 ton storage and metered into R-O-M from strip properties. Raw coal broken to 6 in by McNally rotary breaker prior to washing in three No. 5 McNally Norton automatic washers equipped with rewash facilities for middlings via one McNally Norton automatic rewash jig. New crushing facilities provide for selective crushing of plus 1 in. Remodeled drying facilities include centrifugal drying of ¾x0 prior to application of thermal drying, with 1x¾ to be thermally dried separately. Final sizes, 1x¾ and 1x0, rail loaded via positive car control providing coupled-car continuous loading on all four tracks. Washed-coal storage piles, 2,500 tons each, are provided for truck loading 1x¾ and 1x0 at rate of 500 tph.

Black Diamond Coal Mining Co., Black Diamond, Ala.—Two SuperDuty Diagonal Deck No. 7 coal washing tables from The Deister Concentrator Co., Fort Wayne, Ind., to handle ⅝x0 fraction coal.

Investigate the

PATENTED ENGINEERING FEATURES

of Wilmot Automatic Coal Cleaning Units





WILMOT CONE CLEANER -- Fully automatic; visible-audible signals. One man maintains a battery. Cleans bituminous in suitable stages from 3½" to 0; anthracite, Stove to No. 4.

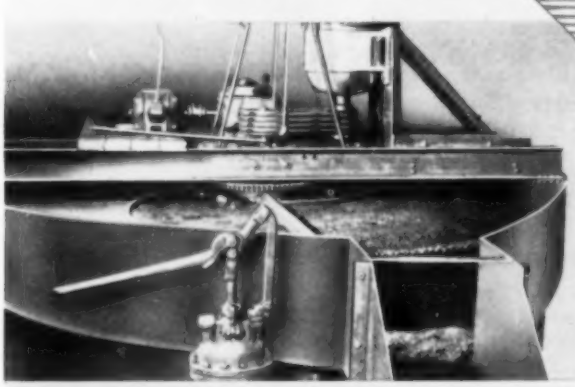
WILMOT FROTH UNIT (below) -- For fully automatic recovery of marketable fines from sludge; uses less oil; 1/8" to 0.

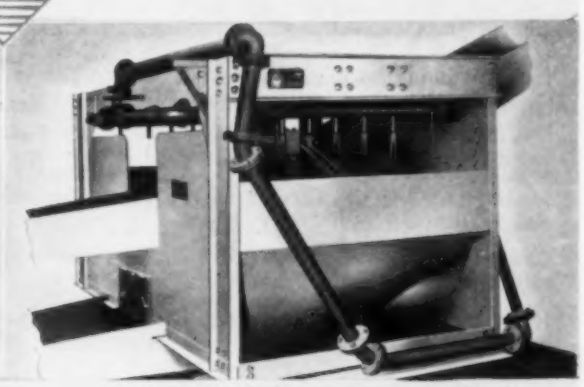
W

WILMOT

WILMOT CLASSIFIER CLEANER -- Cleans bituminous (1/8" x 0), anthracite (-3/64" x +48 mesh).

*WILMOT-OCC HMS VESSEL (below) -- Unprecedented simplicity: unique hydraulic motor, integral with drive shaft, eliminates all power transmission trains; only one moving part in the vessel.



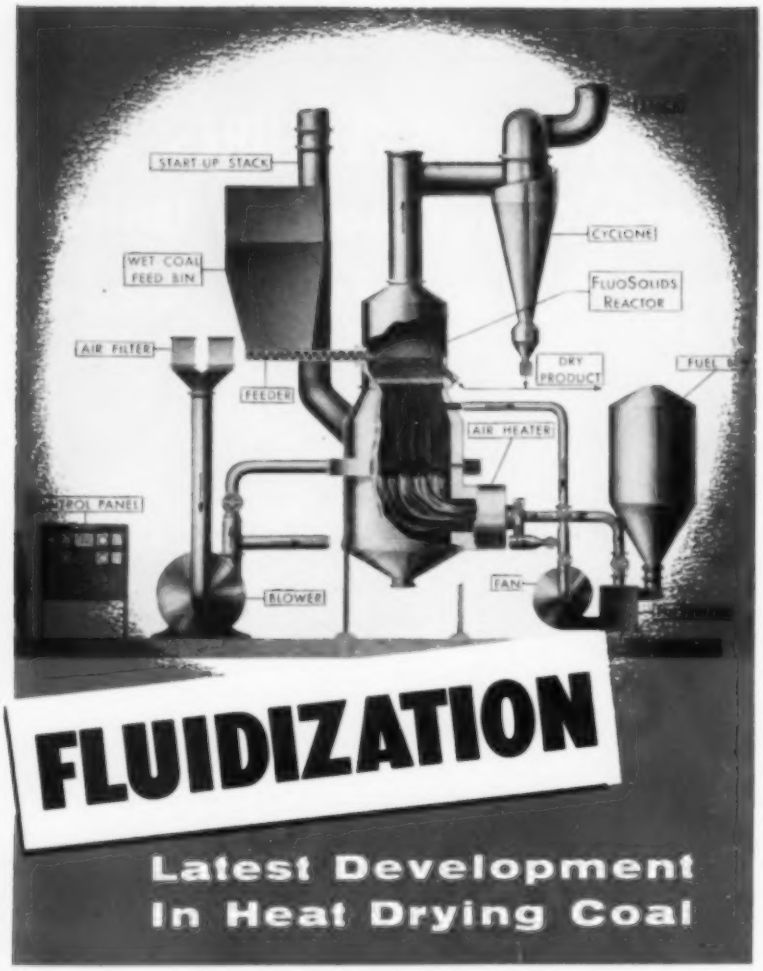


*U. S. & FOR. PATENTS PENDING. THE ORE & CHEMICAL CORP.

Complete Units for Every Purpose

Long a leader in applying automation to the control of labor costs and product quality, Wilmot coal cleaners, with their patented automatic controls, furnish a near approach to push-button operation. Models in all sizes. As constructors of complete preparation plants for over 40 years, we offer a wealth of experienced engineering. Use our laboratory and pilot plant testing services.

WILMOT ENGINEERING CO. HAZLETON, PA. *Plant:* WHITE HAVEN, PA.



FLUIDIZATION

Latest Development In Heat Drying Coal

Now available on a commercial scale, the Dorrco FluoSolids System provides a new and improved method for drying fine coal using fluid techniques. For the preparation plant it offers these proven advantages:

HIGH CAPACITY per unit area . . . up to 200 tons per hour in a single Reactor.

CLOSE OPERATING CONTROL and uniform bed temperature with no oxidation of the finished product.

NO MOVING PARTS inside the Reactor exposed to high temperature or abrasive dust . . . scaling and maintenance reduced to a minimum.

HIGH DRYING EFFICIENCY with each particle surrounded by a film of hot gas . . . vaporization practically instantaneous.

START UP AND SHUT DOWN TIMES easily meet preparation plant requirements.

For more information on this radical departure from conventional fine coal dryers, write for a copy of Bulletin No. 7503. Dorr-Oliver Incorporated, Stamford, Conn., U. S. A.

FluoSolids is a Trade Mark of Dorr-Oliver Inc. Reg. U. S. Patent Office

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

EQUIPMENT APPROVALS

Seven approvals of permissible equipment were issued by the U. S. Bureau of Mines in December, as follows:

Goodman Mfg. Co.—Type 5600 air compressor; one motor, 70 hp, 250 v, DC. Approval 2-1109; Dec. 7.

Long Co.—Type 17-500 utility truck; one motor, 5 hp, 230/550 v, DC. Approvals 2-1110 and 2-1110A; Dec. 14.

Joy Mfg. Co.—Types 10SC11BPE-2 (modified by SBM8726) and 10SC11-BPXE-2 (modified by SBM8727) cable reel shuttle cars; five motors, three 15 hp and two 7½ hp, 250 v, DC. Approval 2-1111; Dec. 15.

Long Co.—Type I.S. conveyor power unit; one motor, 25 hp, 230 v, DC. Approval 2-1112; Dec. 15.

Ensign Electric & Mfg. Co.—Type KG distribution box; one 100-amp and one 225-amp circuit breaker, 250 v, DC. Approval 2-1113; Dec. 16.

Long Co.—Joy Type 14BU7RAE loader; Long Type PT piggyback combination; six motors, two 7½ hp, two 10 hp and two 4 hp; 230 v, DC. Approval 2-1114; Dec. 21.

J. T. Fish & Co.—Rebuilt Joy Type 5SC-8XE cable reel shuttle car; three motors, each 7½ hp, 250 v, DC. Approval 2-1115; Dec. 28.

In addition to permissible equipment approvals, the USBM issued four acceptance designations to cover certain belts that have met the requirements of Schedule 28 concerning fire-resistant qualities.

U. S. Rubber Co.—"U. S. Mine Haul Fire Resistant;" Specifications: 40-30-02, 4 ply, 26 oz; 40-30-01, 4 ply, 42 oz; 40-30-02, 4 ply, 34 oz. Acceptance designation 28-5, Dec. 1.

Goodyear Tire & Rubber Co.—"Coal Flo;" specifications 21372-4, 4 ply, 32 oz; 21372-5, 3 ply, medium rayon; 21372-6, 4 ply, medium rayon; 21372-7, 5 ply, 32 oz; 21372-8, 4 ply, 36 oz; 21372-9, 3 ply, heavy rayon. Acceptance designation 28-3, Dec. 6.

B. F. Goodrich Co.—"Caricoal;" specifications 120, 4 ply, 32 oz; 170C, 4 ply, 2 of 34 oz fabric, 2 of 20 oz cord; 170NF, 4 ply, 34 oz. Acceptance designation 28-6, Dec. 19.

Hewitt-Robins Inc.—"Monarch;" specifications CR/40, 4 ply, 32 oz; CR/50, 4 ply, 32 oz; CR/50, 4 ply, 44 oz; CR/70, 4 ply, 49.7 oz.

Best For Main or Auxiliary Air Supply!



Above: 9′ Joy Axivane Mine Fan teams with an 8′ Joy Fan to provide main ventilation system for Climax Molybdenum Company mine.

Left: 10 H.P. V-belt drive Joy Axivane Fan moves 50,000 feet of air each minute. Ideal for auxiliary or small-mine ventilating duty. Photograph courtesy U.S. Bureau of Mines.

JOY AXIVANE MINE FANS

MAIN AIR SUPPLY Low operating speed, wide operating range, simultaneous . . . and easy . . . blade adjustment, and ready bearing accessibility assure you efficient, dependable ventilation for your mine. The big 9′ Joy Axivane Fan illustrated at top right is in operation at Climax Molybdenum Company's mine in Climax, Colorado. This V-belt driven fan produces air volumes from 81,000 CFM to 770,000 CFM, and above, with pressures up to 15″ w.g. It teams with an 8′ Joy Fan to furnish the main air supply for the Climax mine.

AUXILIARY AIR SUPPLY The 10 H.P. V-belt drive Joy Axivane Fan, illustrated at top left, moves 50,000 feet of air each minute with total pressure of .75 inches. Fitted with reversible motor, this efficient air-moving machine is ready to exhaust stale air or draw in fresh air for the working crews. Remote-controlled adjustable blades allow you precise control of air volume and pressure. It is designed for auxiliary ventilation service in a large mine or for primary ventilation in a small mine.

The vaneaxial design of Joy Mine Fans conforms to the latest formulae of aerodynamics . . . to give you increased efficiency and greater power savings. Joy Axivane Mine Fans are available in sizes up to 12′ in diameter, with air volumes up to 1,120,000 CFM. For full details write to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



Write for FREE Bulletin 56-1

Consult a Joy Engineer

WSW CL5967-56

JOY

WORLD'S LARGEST MANUFACTURER OF VANEAXIAL-TYPE FANS

Personal Notes

H. John Harper Heads Eastern Gas Mining

H. John Harper, general manager of mines, Eastern Gas & Fuel Associates, has been elected vice-president in charge of Eastern's coal division mine operations. The promotion was effective Jan. 1. Mr. Harper succeeds L. C. Campbell, vice-president, who will assume responsibility for the company's long range development of coal properties, serve as company representative in the Bituminous Coal Operators' Association and handle special assignments for the president of the company. Mr. Harper has been with Eastern Gas & Fuel Associates, Coal Div., and its predecessors since 1934. Joining the company as an engineer in the Pittsburgh office, he was later transferred to take charge of developing the company's Kopperston mine in West Virginia. He returned to Pittsburgh in 1939 as project engineer and 2 yr later was promoted to assistant to the general manager of mines. In 1940, Mr. Harper was given responsibility for seven mines: Keystone, Carswell, Maitland, Wharton, Kopperston, Weeksbury and Butler Junction. He became assistant to the vice-president in 1944, general manager of mines in 1951. Mr. Campbell is one of the nation's mining authorities. His background of 38 yr experience includes both metal and coal mining. He has been associated with coal operations of Eastern Gas & Fuel Associates and its predecessors for more than 25 yr and has been in charge of the company's mining operations since 1941. Recently, he was re-elected president of the National Coal Association. He has served on its board of directors for several years and has headed its Executive and Safety committees. He is also chairman of the Coal Div., American Mining Congress, and has held National Safety Council posts.



HARPER



CAMPBELL

Key Appointments Made At Island Creek

On top of the news that Island Creek Coal Co., Holden, W. Va., had acquired the Red Jacket Corp. (*Coal Age*, Jan. '55, p 112), came the announcement last month of eight major appointments among key Island Creek and Red Jacket operating executives. The appointments, announced by N. T. Camicia, general manager of mines, went this way: **Rhein H. Tinsley,** assistant division manager of Island Creek's Bartley Div. and former trackman, was made manager of the Red Jacket Div. with headquarters at Red Jacket, W. Va. 2) **Michael M. Marchich,** assistant manager of the Holden Div., was appointed manager of the Wyoming Div., with headquarters at Marianna, W. Va. 3) **Milton B. Harper,** an Island Creek superintendent (Mine No. 26) in the Rockhouse Div., was appointed superintendent of the Keen Mountain Mine, Bartley Div., in Buchanan County, Va. 4) **Louis Skiba,** night mine foreman of Mine No. 7, Holden Div., was appointed superintendent of the Mitchell Branch Mine. 5) **G. Frank Davis,** a Red Jacket executive, was appointed superintendent of the Junior Mine, Red Jacket Div. 6) **Milburn W. Hall,** former general mine foreman of Mine No. 27, Holden Div., was appointed superintendent of Mine No. 17. 7) **O. L. Childress,** superintendent of the Marianna Mine, was appointed superintendent of the Wyoming Mine, Wyoming Div. 8) **Douglas W. Halstead,** superintendent of the Wyoming Mine for Red Jacket was appointed superintendent of the No. 12 Mine at Coal Mountain, Wyoming Div., W. Virginia.



MARCHICH



TINSLEY

BRIEFLY . . .

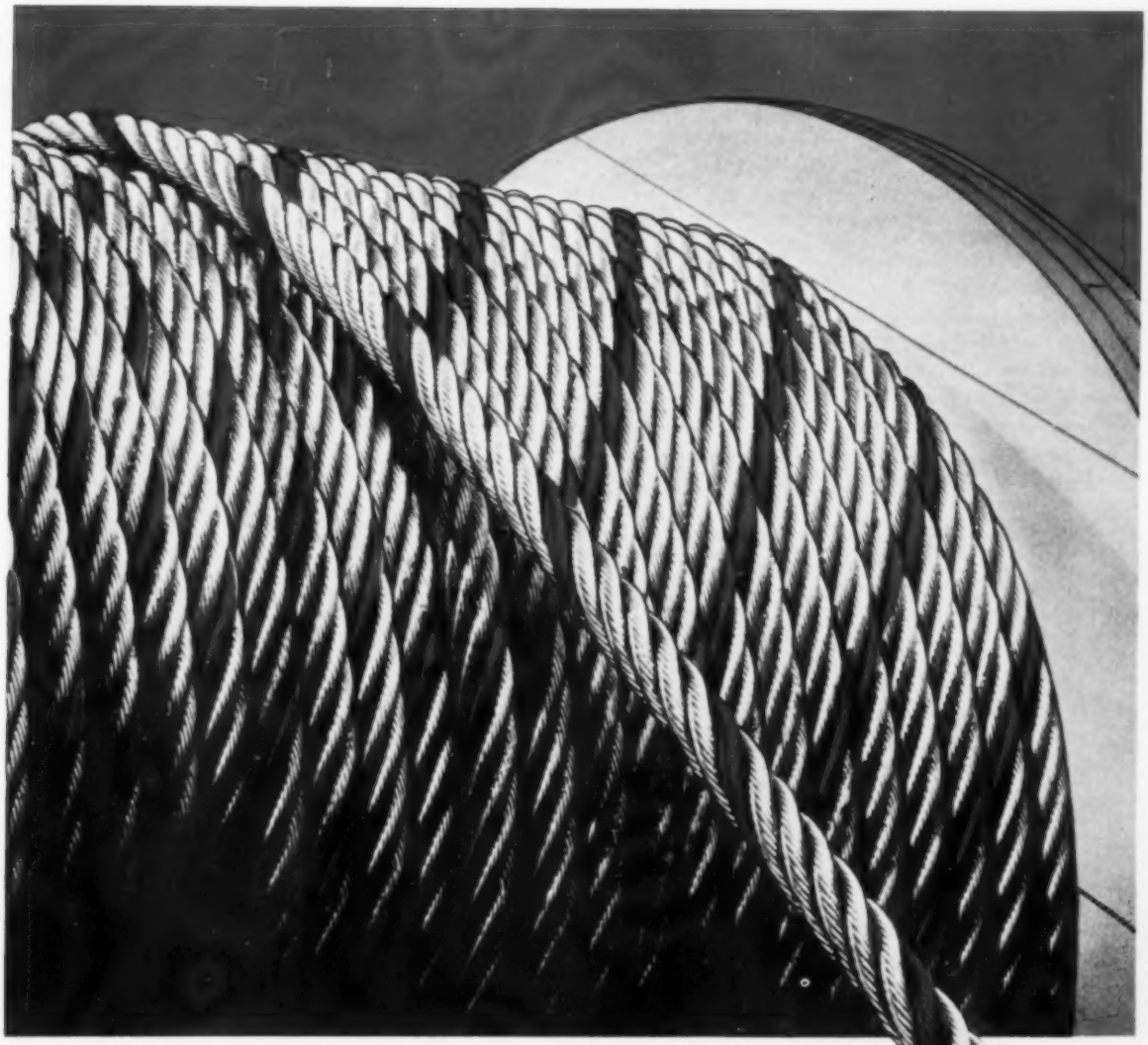
Because it was selling underwear nearly as fast as hard coal Philadelphia & Reading Corp. changed its administrative setup two days before the New Year to "reflect its new status and objectives as a diversified holding and management company." As a result of this attitude the company's directors created the job of chairman of the board, electing **Benjamin Graham** to the post, then elected **Howard A. Newman** president and chief executive officer. At the same time (Dec. 29) the company announced that Edward G. Fox, president of P&R since 1951, will watch over coal operations only as president of P&R's subsidiary, Reading Anthracite, and vice president of P&R. The new officers assumed their duties Jan. 1. P&R bought the Union Underwear Co. last August. Union Underwear sales totaled $27,000,000 in 1955. Mr. Newman points out that this figure is "roughly equal to 75% of P&R sales of hard coal."

E. E. McBurney, vice-presidential assistant of the Jewell Ridge Coal Corp., Tazewell, Va., has been appointed general manager of mines for Jewell Ridge and for the Jewell Eagle Coal Co. The appointment was effective Jan. 1. Mr. McBurney will direct operations of the eight active mines operated by the two companies in Tazewell and Buchanan counties, Va.; in Logan County, W. Va., and in Perry County, Ky. A former assistant superintendent of Island Creek Coal Co., Mr. McBurney joined Jewell Ridge in 1952 as chief industrial engineer. He was promoted to general superintendent of the Virginia mines in 1953. In April, 1955, he was promoted to vice-presidential assistant.

Peters Creek Coal Co. announced Dec. 29 that four men had been promoted to new posts. Two of the posts were vice-presidencies and were filled by **Robert E. Kamm** and **William S. Bryant.** Mr. Kamm, superintendent of Cornelia mine in Summersville, W. Va., was made operating vice-president. Mr. Bryant, Peters Creek office manager for a number of years, became vice-president of finance. Both men were elected vice-presidents by a unanimous vote of the Peters Creek board of directors. The two remaining promotions came as vacancies opened behind Mr. Kamm's move up. His former job of superintendent was awarded to **John Wright,** a mine foreman. In turn, **Percy Eads,** a section foreman, was advanced to mine foreman.

Glen Alden Corp., Wilkes-Barre, Pa., announced last month that Sheldon P. Wimpfen, manager of the Atomic Energy Commission's Operations Office, Grand Junction, Colo., will join the organization March 1 as vice-president. A former editor of Mining Congress Journal (1949 to 1950), Mr. Wimpfen joined the AEC as an assistant director of the division of raw materials, Washington, D. C. He will continue as a consultant to the AEC.

Richard J. Stakelum and George C. Bruner, sales executives of the Tennessee Coal & Iron Div., U. S. Steel, have retired. Mr. Stakelum, general manager of sales retired Dec. 31. Mr. Bruner, assistant general manager of sales, eastern area, retired Jan. 31. Two men were named to succeed them in the vacated posts. **John W. Todd Jr.,** an assistant general manager of sales, administrative, will succeed Mr. Stakelum, and **Roy C. Rhodes,** manager of sales, Houston, Tex., will succeed Mr. Bruner. Mr. Stakelum joined U. S. Steel in 1908 as a file clerk in the New Orleans sales office of the American Sheet & Tin Plate Co. He was appointed general manager of sales in 1945. Mr. Bruner joined Tennessee Coal & Iron in 1909 as



How to get more work out of your wire rope

Get *higher-than-rated quality.*
Use Hercules Red-Strand.
It costs no more.

LESCHEN
HERCULES *Red-Strand*® WIRE ROPE
HKP

from leading distributors

LESCHEN WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.
St. Louis 12, Missouri

a stenographer in the sales department. He was appointed assistant general manager of sales in 1945.

R. B. Williamson, a vice-president of Pittston Clinchfield Coal Sales Corp., has been named president of Lillybrook Coal Co. and the Amigo Smokeless Coal Co., Beckley, W. Va., subsidiaries of the Pittston Co. The former president of the two companies, J. M. Miller, has been named board chairman.

Four men have been appointed to fill key positions in the research and mine-drainage program being conducted in Pennsylvania's anthracite district. The men are **Charles S. Kuebler,** Summit Hill, Pa., director, Anthracite Experiment Station, Schuylkill Haven, Pa.; **John W. Buch,** Schuylkill Haven, Pa., chief, Branch of Mining; **Henry A. Dierks,** Kingston, Pa., chief, Branch of Mine Drainage; **James W. Eckerd,** Shavertown, Pa., chief, Branch of Utilization and Preparation.

Frederick S. McConnell, president of The Enos Coal Mining Co., Cleveland, Ohio, retired last month. George E. Enos, executive vice-president, succeeded Mr. McConnell. **Ortho L. Scales** succeeded Mr. Enos. Mr. McConnell has long been active in work to improve mechanical mining. He has been a director of the National Coal Association and served as its president from 1943 to 1947. He has also been president of the Bituminous Coal Institute.

John I. Yellott, for 10 yr research director of the Locomotive Development Committee, Bituminous Coal Research, Inc., New York, has been named an assistant director of Stanford Research Institute. Dr. J. E. Hobson, SRI's director, has indicated that Mr. Yellott will head the development of the Institute's solar energy research program in cooperation with the Association for Applied Solar Energy. Mr. Yellott will be situated in Phoenix, Ariz., the location of SRI's Mountain State Div. Peter R. Broadley, an assistant director of the Locomotive Development Committee's project, will be promoted to director of research, succeeding Mr. Yellott.

Paul T. Allsman, Kensington, Md., has been appointed chief mining engineer of the Bureau of Mines. A member of the USBM since 1936, Mr. Allsman was assistant regional director for metals and minerals of the 27-state eastern region of the Mines Bureau, College Park, Md. He succeeds **Eugene D. Gardner,** who retired last year.

Harold L. Beattie has been appointed vice-president of operations of the Elk River Coal & Lumber Co., Dundon and Widen, W. Va. He was formerly production engineer.

Douglas Crickmer, superintendent of the Pond Creek Collieries mines near Williamson, W. Va., resigned last month to join the Pocahontas Land Co., Bluefield, W. Va. James D. Carter, preparation engineer of the Red Jacket Coal Corp., succeeded Mr. Crickmer.

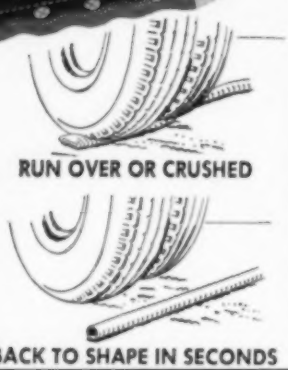
NO CRUSH DAMAGE
to Hamilton's
REVELATION
...because it's
CORD INSERTED



Supplied with rod cover

No wire is used in the carcass of Hamilton REVELATION Suction Hose. Specially-treated, hard-twisted cord and multi-ply heavy duck insure recovery to original shape and prevent failure due to crushing abuse.

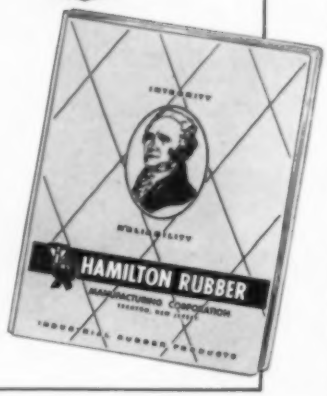
REVELATION provides a smooth-bore suction hose for mining or construction work in six popular sizes from 1" to 3" I. D. Ask your jobber for details or . . .



WRITE, WIRE, PHONE

If you would know more about Hamilton and our complete line of Industrial Rubber Products . . . Hose . . . Belts . . . Packings and Mats write, wire or 'phone today for our all new Catalog. A copy belongs in your reference library.

NOW



Be sure...use Hamilton... Always dependable!

OVER 86 YEARS OF SERVICE TO INDUSTRY

HAMILTON RUBBER MANUFACTURING CORPORATION

Executive Office and Factories, 1027 Meade St., Trenton, N. J.

Branches in
CHICAGO • HOUSTON • LOS ANGELES
NEW YORK • CLEVELAND • PITTSBURGH
INDIANAPOLIS • SAN FRANCISCO

Association Activities

A 14-member committee composed of seven members of the National Coal Association and seven members of the American Coal Sales Association has been formed to determine the amount of financial support available to develop a markets program. At its first meeting, Jan. 18, the committee met to study a report by Booz, Allen & Hamilton, management consultants.

These men are representing the NCA: L. C. Campbell, president of the NCA; R. L. Ireland, Pittsburgh Consolidation Coal Co., Cleveland, Ohio; John L. Kemmerer, Jr., Kemmerer Coal Co., New York, N. Y.; Ralph H. Knode, Stonega Coke & Coal Co., Philadelphia, Pa.; Harry LaViers, South East Coal Co., Paintsville, Ky.; Charles A. Owen, Imperial Coal Corp., New York, N. Y.; M. L. Patton, Truax Traer Coal Co., Cincinnati,

(*Continued on p 139*)

High Production and Lower Maintenance–

You Get BOTH with "Eucs"



Built for tough off-the-highway service, Rear-Dump Euclids have increased production and reduced hauling costs on scores of open pit mining and quarry operations. Ability to deliver "plus" performance year in and year out has made "Eucs" the accepted standard for comparison . . . here are some of the reasons why:



RUGGED SIMPLICITY

Designed and built for long life and low maintenance cost. All of Euclid's experience and facilities are devoted to specialized off-the-highway earth moving equipment.

CAPACITY

Euclids have payload capacities of 10, 15, 22, 34 and 50 tons. Because they are matched to various sizes of loading and crushing equipment, "Eucs" provide a well balanced operation for open pit haulage and increase the efficiency of the loading unit.

POWER AND SPEED

Powered by diesel engines of 125 to 600 h.p. "Eucs" have top speeds with full payload, up to 36 m.p.h. Five and ten speed transmission, or torque converter with semi-automatic transmission available. The favorable ratio of horsepower to payload means more pay tons hauled every trip.

VERSATILITY

"Eucs" are efficient for moving any material on any length of haul; handle overburden, rock, coal, ore and other materials loaded by shovels, draglines, transfer hoppers and mobile loading equipment.



If you are interested in higher production at lower cost, have your nearby Euclid Distributor show you what "Eucs" are doing on work similar to yours. He'll be glad to make a hauling cost estimate for your job—no obligation, of course.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



STAYS STABLE ...Hot or Cold!



Sinclair JET LUBRICANT won't thin out at high temperatures. It maintains lubrication at frigid temperatures. This superior product stays put on heavy exposed gears and circle tracks. It resists wash-out, throw-out and drip.

JET LUBRICANT saves money, too, because it lasts longer . . . reduces lubricant consumption . . . helps to lower power consumption. No heating is required to make it usable direct from its container.

There are *more* reasons why the right grade of JET LUBRICANT and other Sinclair products can improve your operations. Why not let a Sinclair Lubrication Engineer help solve *your* lubrication problem. *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N.Y.

SINCLAIR JET LUBRICANT

Associations *(from p 136)*

Ohio; and R. E. Salvati, Island Creek Coal Co., Huntington, W. Va. Mr. Campbell named himself ex-officio.

These men are representing the ACSA: S. L. Jewell, president of the ACSA; H. P. Junod, Pickands Mather & Co., Cleveland, Ohio; Dr. Huston St. Clair, Jewell Ridge Coal Sales Co., Tazewell, Va.; James N. Sherwin, The M. A. Hanna Co., Cleveland, Ohio; L. N. Thomas, Carbon Fuel Sales Co., Charleston, W. Va.; W. S. Webster, Walter Bledsoe & Co., Terre Haute, Ind.; and H. D. Wright, Republic Coal & Coke Co., Chicago, Ill.

George E. Enos, president of the Enos Coal Mining Co., Cleveland, Ohio, and Frank Nugent, executive vice president of the Freeman Coal Mining Corp., Chicago, Ill., were elected to the board of directors of the National Coal Association Jan. 10. Mr. Enos is filling the unexpired term of Frederick S. McConnell, Cleveland, Ohio, who has retired as president of the Enos Co. Mr. Nugent is filling the unexpired term of George B. Harrington, Chicago, Ill. Mr. Harrington, for 40 yr president of the Chicago, Wilmington & Franklin Coal Co., resigned from the NCA board last month.

A newly elected executive board of the Illinois Coal Operators Association elected A. H. Truax president during the 26th annual meeting of the association Dec. 20 in Chicago. The board also re-elected Fred S .Wilkey secretary. Earlier, the association's membership voted these men into executive board posts: Stuart Colnon, Merl C. Kelce, Frank F. Kolbe (chairman), George C. McFadden, James W. Morgan, Thomas C. Mullins Jr., Mr. Truax and William P. Young. C. W. Peterson was elected treasurer.

R. L. Ireland has been elected Chairman of the General Committee of the Coal Producers Committee for Smoke Abatement. Mr. Ireland, chairman of Pittsburgh Consolidation Coal's executive committee, was elected unanimously at the Smoke Abatement members' annual meeting in Cincinnati, Dec. 15.

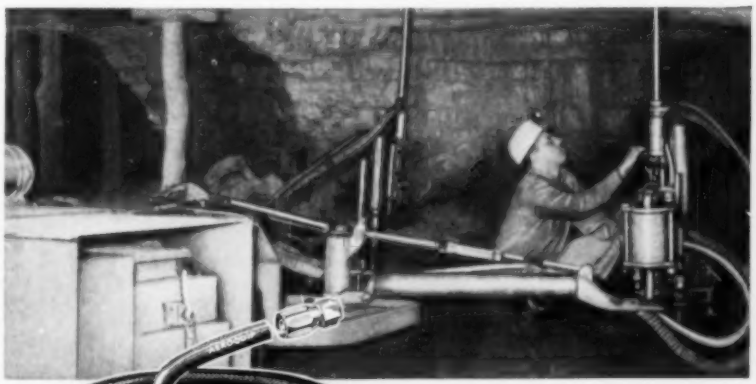
Obituaries

Charles Gelso, a Luzerne County, Pa., coal operator, died Jan. 12 in Phoenix, Ariz. Mr. Gelso operated No. 14 Colliery in Port Blanchard, Pa. A number of years ago he had been employed as a contractor by the Pennsylvania Coal Company.

Edward W. Bratton, vice president of the Maust Coal & Coke Corp., New York, N. Y., died Dec. 25. He was 58. Mr. Bratton became associated with the coal industry before World War I when he was employed by the W. J. Rainey Co. as payroll clerk in its Allison Mine. After service in the Army he was trans-

Aeroquip Flexible Hose Lines Cut Downtime . . . Last Longer

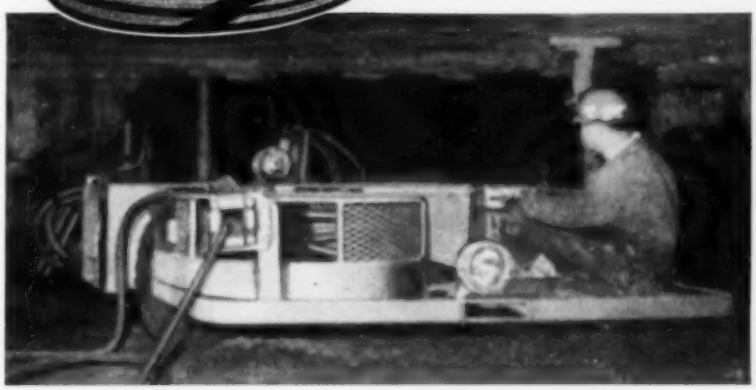
"WE USE THEM EXCLUSIVELY IN THE HYDRAULIC SYSTEM OF OUR JUMBOLTER", says M. H. Evans, Acme Machinery Co.





Above—Stopers can work over an area 23 feet wide from this Acme Jumbolter.

Below—Aeroquip hose lines are made to withstand the abrasion, shock and rough usage in the mine.



Aeroquip flexible hose lines are used for all hydraulic applications on roof bolting equipment produced by Acme Machinery Company, Williamson, West Virginia. Acme prefers Aeroquip because it withstands the flexing and abrasion encountered in stoping operations.

For equipment operators, Aeroquip speeds replacement of damaged fluid lines. The reusable fittings can be attached to a new length of hose with ordinary hand tools. Installation takes only minutes. For complete information, call the Aeroquip distributor listed in your Yellow Page Directory, or write us.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U. S. A. AND ABROAD
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U. S. A. AND ABROAD

Snap-on* TORQOMETERS



Check roof bolt tension safely-accurately

Roof bolt tension is an important detail affecting the safety of workers. Here's how Compass Coal Co., Philippi, W. Va., double checks bolt-tightening equipment with *Snap-on* Torqometer wrenches at their Deep Mines 1 and 2.

A four-man crew follows the loading crew and installs six bolts on 4-ft centers. Average bolting time is 20 min per place. All bolts are installed with 6 x 6 x ⅜-inch bearing plates and tightened to a torque of approximately 150-ft-lb.

To insure continuous security of roof structure, daily checks are made with *Snap-on* Torqometer wrenches and proper tensions maintained if necessary.

Yes, *Snap-on* Torqometer wrenches are the answer where accuracy and safety are important. They're as easy to handle as ordinary wrenches; simple, too — even the most inexperienced worker can hit specified bolt torque every time. Big, easy-to-read dials measure torque with hairline accuracy. What's more, readings are consistent . . . not affected by the way wrench is held.

Snap-on Torqometers are built in numerous dial-reading and indicating models — capacities from 0 to 30 in.-lb up to 4,000 ft-lb. *Snap-on* is ready to serve your requirements with a complete line of 4,000 hand and bench tools. Write for new 108-page *Snap-on* catalog.



SNAP-ON TOOLS CORPORATION
8132-B 28th Avenue • Kenosha, Wisconsin
*Snap-on is the trademark of Snap-on Tools Corporation.

ferred to the company's operating office in Uniontown, Pa., in 1919. By 1925 he had been transferred to the company's New York office and in 1932 was elected vice president. After moves to Pittsburgh and Philadelphia he joined the Maust Coal & Coke Corp. in 1941. He was elected vice president there in 1945.

Books for Coal Men

Carbon Monoxide Detection

Methods for Detecting and Determining Carbon Monoxide is the latest revision of the publication. Included are descriptions of the newest devices for detecting and measuring carbon monoxide. *USBM Bulletin 557. 8x10½-in; paper; mimeo. 30¢. Superintendent of Documents, Government Printing Office, Washington 25, D. C.*

Hoisting and Haulage Accidents

Accidents from Hoisting and Haulage at Metal and Nonmetallic Mines is a circular prepared especially by the USBM as an instruction book in its accident-prevention course for miners. It describes many accidents and tells how they could have been prevented. *USBM Miners' Circular No. 53. 8x10½-in; paper; mimeo. 40¢. Superintendent of Documents, Government Printing Office, Washington 25, D. C.*

TVA Report

Annual Report of the Tennessee Valley Authority covers all aspects of the TVA program, including power generation, flood control, navigation, fertilizer and munitions research and development, and agriculture and forestry. Three appendixes cover financial statements, statistical statements, and power contracts and agreements. *67 pp. plus appendixes. 6x9-in.; paper. 65¢. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

Mine Rescue

Mine Rescue Work, by R. McAdam and D. Davidson. Describes the construction and action of many types of breathing apparatus used in mine rescue work in Great Britain and includes chapters on resuscitation, transportation of casualties, fire fighting, mine gases, rescue and fire fighting plans and the organization of rescue work. *183 pp. 6x9-in; cloth. 21/, Oliver and Boyd, 39a Welbeck St. W. 1, London, England.*

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications Distribution Sec., 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10½-in; paper; mimeo.

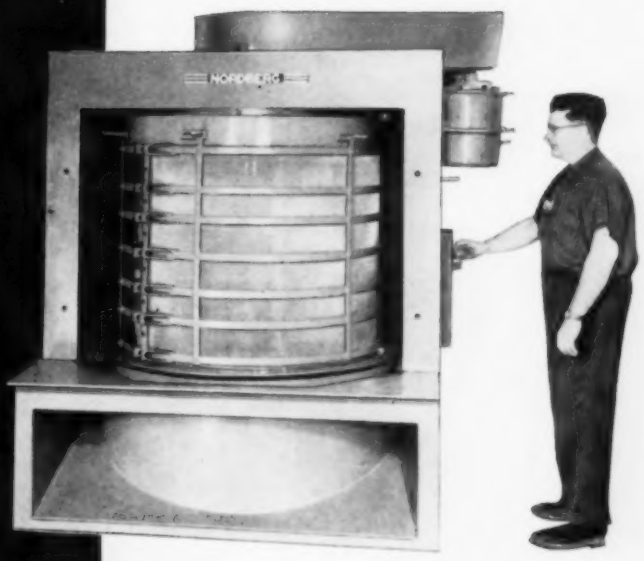
Some Practical Aspects of Appraising Coal-Washing Results, by H. F. Yancey and M. R. Geer. *R. I. 5153. 15 pp.*

Grindability Testing of Lignites, by R. C. Ellman and J. W. Belter. *R. I. 5167. 38 pp.*

Effect of Anthrafines on Expansion of Coking Coals, by J. B. Gayle and W. H. Eddy. *R. I. 5176. 18 pp.*

SYMONS V SCREEN

for Maximum Efficiency in Coal Dewatering



. . . THE ONLY SCREEN THAT DOES NOT DEPEND ON GRAVITY ALONE TO SIZE OR DEWATER

The SYMONS V-SCREEN combines centrifugal force with gravity to do a better screening job—make sharper separations—and give you a much dryer product with less degradation than other dewatering methods. It will reduce surface moisture by at least 50%, even on fine coals, and requires only 5 hp to operate under full load.

For example: In actual coal dewatering applications, with various feed sizes ranging from ⅛" x ¼" to ¼" x 0", the V-Screen is successfully reducing surface moisture of the feed as much as 65% . . . with product surface moisture content as low as 3.03%.

The capacity of the Symons V-Screen is over twice that of a conventional type vibrating screen, per square foot . . . with average tonnages ranging from 35 to 70 tph per screen. In addition, its new screening principle gives extremely long screen cloth life.

Mail the coupon for full details.

FEATURES:

- **HIGH CAPACITY**
- **EXTREMELY ACCURATE SIZING, EVEN IN THE FINER MESHES**
- **HIGHLY EFFICIENT DEWATERING**
- **FULLY ENCLOSED—DUSTLESS OPERATION**
- **EASY REPLACEMENT OF SCREEN CLOTH**
- **MINIMUM FLOOR SPACE REQUIRED**
- **LOW COST OPERATION**



Clip and mail the coupon for your copy of the new, informative Bulletin 243, which gives the story on Symons V-Screens.

NORDBERG MFG. CO. • Milwaukee, Wisconsin

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

NORDBERG MFG. CO. CA
Milwaukee, Wis.

Please send me a copy of the new Symons V-Screen Bulletin 243.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

© 1955, Nordberg Mfg. Co. S355

SYMONS . . . *A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD*



The going's good from any angle

Throw that turnout either way, and the trip will roll as smoothly and speedily as if there were no turnout there. That's because the trackwork was designed and tailor-made precisely for this mine by Bethlehem men who specialize in mine-track work like this.

The rail is in the 60-lb-and-over class to assure efficient haulage, not just today but in the heavier-traffic days to come. All components of the turnouts were expertly built to exact size, pre-curved where necessary, then completely pre-assembled at our plant to make sure of a perfect fit at the final site. Every detail was thoroughly planned . . . nothing left to chance, nothing left to the cut-and-try or by-guess-and-by-golly categories.

Yet for Bethlehem this was not a "special" job. Every mine-track problem gets the full treatment, as you will find when you talk to a Bethlehem engineer about your workings. You'll like his cooperative attitude and his intimate knowledge of mining that lets him keep right up as you outline what you have in mind.

If your maintenance costs are climbing or operating efficiency beginning to sag, perhaps discussion with a Bethlehem mine-track engineer could mark a turning point. In any event you've nothing to lose by calling him in, and he'll welcome the opportunity to help. He's available through the Bethlehem office nearest you.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Among the Manufacturers

John Lawrence, an executive vice president of the Joy Mfg. Co., was elected president and chief executive officer of the company last month. He succeeded J. D. A. Morrow, who had guided Joy through an annual domestic sales climb of $5,000,000 (1940) to $92,000,000 (1955) since he became president Aug. 6, 1940. Mr. Morrow, 74, was elected to the new office of chairman by Joy's directors. The board also advanced W. L. Wearly to executive vice president. Mr. Wearly's job of vice-president of sales was filled by H. C. Nyquist, the company's vice president of coal machinery sales. Mr. Lawrence joined the company in 1951 as vice president of manufacturing. He was promoted to executive vice president more than a year and a half ago. Last year he became a director.

Edward R. Couch has been appointed manager of stationary compressor sales for the Le Roi Div., Westinghouse Air Brake Co., Milwaukee, Wis. Mr. Couch will plan sales, assist in promoting a sales and service program and assist field personnel on special applications. In another appointment the company announced that **Paul Azzolina** has been named manager of the service department. Mr. Azzolina will be responsible for supervising field servicing of all Le Roi products, maintaining the parts department and publishing service bulletins and parts catalogs.

William F. Briney has been named manager of construction industry sales for the Le Roi Div., Westinghouse Air Brake Co., Milwaukee, Wis. He joined Le Roi in 1949 as a sales and service trainee. In his new job Mr. Briney will plan the sales of portable air compressors, "Tractairs," rock drills, and other products used in construction and mining.

The Frank G. Hough Co., Libertyville, Ill., has enlarged the territories of three companies authorized to handle the sales, service and parts business of "Payloader" tractor-shovels and tractors. Rish Equipment Co., with plants in Cleveland, Columbus, Dayton, Toledo, Cincinnati and Portsmouth, will distribute in the entire state of Ohio. Brandeis Machinery & Supply Corp., Mt. Vernon, Ill., has been given additional territory in southern Illinois. J. D. Evans Equipment Co., Sioux Falls, will cover the entire state of S. Dakota.

General Motors announced last month that it intends to spend $1 billion this year for expansion and projects already underway. The expenditure, the largest ever planned by the company in a single year, would not be used to meet current production expenses, said Alfred P. Sloan Jr., chairman of the GM board.

Three district sales manager appointments (central, eastern, southeastern) were announced last month by Hardinge Co., Inc., York, Pa. Ellsworth B. Doelp was named district manager of the company's central territory with headquarters in Chicago. **H. Sidney Downes** became eastern district manager and **Clarence Blair Brown Jr.** was appointed southeastern district manager. Mr. Doelp will head Hardinge sales in Illinois, Indiana, Missouri, Arkansas, Oklahoma, Kansas, Nebraska, Iowa and parts of Texas, Wisconsin, Michigan and Kentucky. Mr. Downes' territory includes the western section of New York and Pennsylvania, all of Ohio and West Virginia, and most of Kentucky. Mr. Brown will cover eastern Pennsylvania, eastern Maryland, Delaware, Virginia, N. Carolina, S. Carolina, Tennessee, Alabama, Mississippi and a section of Louisiana.

A former vice president of the Thew Shovel Co., E. E. Esgate, has been appointed general sales manager of the Wooldridge Mfg. Div., Continental Cop-



the world's largest shovels and draglines are lubricated by....

WHITMORE'S

1. Gear Protective Composition for use on open gears
2. Anti-Friction Composition for use on sleeve, ball, or roller bearings, high or low speed
3. Lubricants for reduction gear units
4. Pressure-Proof Lubricants (Super E.P.) for heavy duty trucks and tractors
5. Cable Lubricants for use on wire ropes and cables
6. Our New Liquid Gear Composition can be applied without heating by painting, pouring or by automatic lubricator

Serving the Mining Industry for more than sixty years

WHITMORE'S LUBRICANTS

WHITMORE'S PRESSURE-PROOF LUBRICANTS SUPER E.P.

THE WHITMORE MFG. CO., *Factory and General Offices,* CLEVELAND 4, OHIO, U.S.A.

TWO TOOLS

that bring further automation to your coal production



In the coal industry, Simplicity Os-A-Veyor Feeders have proven themselves to increase operating efficiency and lower the costs of maintenance. Simplicity Os-A-Veyor Feeders are self-cleaning units which experience none of the carryback or spillage found in other types of feeders. They are designed to decrease bridging and provide even feeding. The oscillating action is provided by two eccentric shafts coupled to a single V-belt drive, leaving only one assembly and four bearings to lubricate. Os-A-Veyor Feeders can be either main frame supported or bin-hung by springs and cables.



Simplicity Grizzly-Feeders can cut your coal handling costs 50% because they combine two operations . . . scalping and feeding . . . in one machine. Old type feeder plus stationary grizzly are eliminated, thus saving you both plant room and operating and maintenance expense. Available in sizes from 2′ x 8′ to 6′ x 12′, and in capacities up to 1000 tons per hour, the Simplicity Grizzly-Feeder has already improved production for many coal operators, and can do the same for yours. This is a rugged, simply-designed unit that will give you maximum output with very little maintenance.

Write us for full information on both the Simplicity Os-A-Veyor Feeder and the Grizzly-Feeder.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND 19, MICHIGAN

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.
FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario
FOR EXPORT: Brown and Sites, 50 Church St., New York 7, N.Y.

172

per & Steel Industries, Inc., Sunnyvale, Calif.

Morris Machine Works, Baldwinsville, N. Y., manufacturer of heavy-duty slurry pumps, has appointed Cross Pump & Equipment Co., Charleston, W. Va., its sales representative in southern West Virginia, eastern Kentucky, and western Virginia.

R. F. Parker has been appointed manager of mining, Carboloy Dept., General Electric Co., Detroit, Mich. Mr. Parker's duties include the sale of fabricated mining tools.

J. V. Carlin Jr. has been appointed assistant general sales manager of the Acme Rubber Mfg. Co., Trenton, N. J. He will assist J. V. Carlin Sr., general sales manager. The younger Mr. Carlin joined Acme's sales force in 1947.

George C. Johnson has been appointed sales manager of the Hamilton Rubber Mfg. Corp., Trenton, N. J. Mr. Johnson has been the company's promotional sales manager for five yr. He joined the Hamilton organization in 1950.

Robert C. Ochs, assistant general manager of the Axle Div., Eaton Mfg. Co., was moved up to general manager last month. Mr. Ochs became associated with the Eaton company in 1947 and was employed in its Central Research Div. He joined the Axle Div. staff in 1952.

Thomas E. Brown, manager of the Hazleton, Pa., sales office of Hercules Powder Co., Wilmington, Del., has been appointed manager of the Pittsburgh, Pa., office. Mr. Brown has been succeeded in Hazleton by **John H. Wilson,** who was moved up from assistant manager.

Norman W. Long, a former assistant engineer of the Red Jacket Coal Corp., W. Va., has joined the Goodman Mfg. Co., Chicago, Ill., as sales engineer. Before his association with Red Jacket, Mr. Long had served with Semet Solvay Co. and Princess Dorothy Coal Co.

Sal Colacuori, general supervisor of motor truck sales engineering, International Harvester Co., has been appointed sales supervisor, motor truck product development. N. L. Ginder, a sales engineering consultant, has succeeded Mr. Colacuori.

Raymond H. Whitney has been appointed southeastern district manager for the Morse Chain Co., Ithaca, New York. Mr. Whitney will be situated in Charlotte, N. C., where he will manage sales of the company's power transmission products.

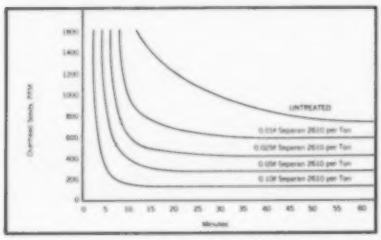


COAL FINES SETTLE 17 TIMES FASTER WITH ADDITION OF SEPARAN 2610

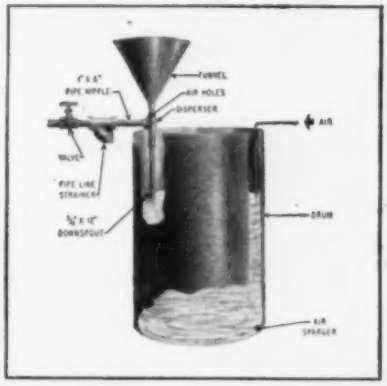
New flocculating agent breaking bottlenecks in nearly every use

A coal thickener in a West Virginia plant was overloaded. It took over 2 hours to clear to the desired 300 ppm overhead solids. Separan* 2610 was added at the rate of 0.05 lb. per ton of fines. Clarification time was cut from 2 *hours* to 7 *minutes*! 17 times faster! Besides cleaning up overheads and avoiding stream pollution, you can employ closed circuits and conserve water with this new flocculating agent. You can cut down recycle solids and reduce maintenance. You can recover more fines by improving filter rate. And, very important, you can increase plant capacity by getting more throughput on present equipment.

COAL FINES—SETTLING RATE



Separan 2610 is different. It's a synthetic, organic polymer that is effective in both acid and alkaline media. It's highly economical. It requires no preservative. But that's not all! It's noncorrosive and presents no health hazard in normal handling and use. And it's easy to prepare and apply. Interest aroused? Write for particulars and a sample to THE DOW CHEMICAL COMPANY, Dept. TS 930E, Midland, Michigan.



New disperser has been developed by Dow to permit dissolving of large amounts of Separan 2610 without use of a mechanical mixer. This solution needs no preservative in normal storage or use. **Trademark*

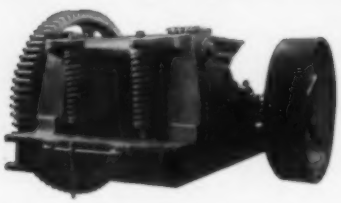
you can depend on DOW CHEMICALS

for the MOST DEPENDABLE, MOST ECONOMICAL

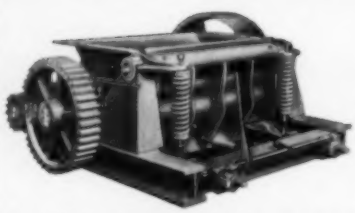
COAL CRUSHING EQUIPMENT

Specify

McLANAHAN



Single Roll Rockmaster Crusher for both primary and secondary crushing of rock and mine refuse. Bulletin RM-505.

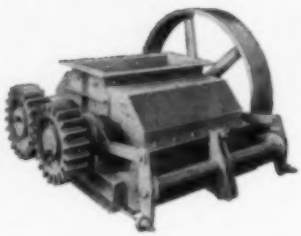


Single Roll Black Diamond Crusher with exclusive automatic steelstrut toggle and quick adjustment. Bulletin BD-457.

write today for bulletins



The low cost McLanahan Bantam Buster Single Roll Crusher. Bulletin BB-5112.



McLanahan Black Diamond Double Roll Crusher for various reductions of medium-size feeds. Bulletin BDDR-255 (for coal) and DR-155 (for rock).

Backed by 120 years of manufacturing experience, McLanahan builds crushing equipment for the ultimate in economy through long service and minimum maintenance costs. This equipment, which has been thoroughly service-proven on the most demanding of domestic and foreign installations, is available in a variety of sizes for every coal crushing requirement. McLanahan is equipped to produce complete units, from feeders, primary and reduction crushers through elevators, sizing screens, etc.

McLANAHAN & STONE CORPORATION

PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835

250 Hunt Street, Hollidaysburg, Pennsylvania

News Briefs (from p 124)

habilitating the mine which was closed in 1952 when orders fell off and coal cars became short. Before its closing the mine produced about 1,000 tpd from the Sewickley seam. It employed some 125 men.

Johnstown Coal & Coke Co., Johnstown, Pa., has bought the Williams River Mine and the assets of the Gauley Mountain Coal Co., Webster County, W. Va. No price has been disclosed. The company says that it will change the name of the mine to Crichton No. 5 and begin a program of improvements to increase production. Operations will be conducted by a newly formed subsidiary, the Villiams River Coal Co. The mine is situated several miles from Cowen, W. Va., and is served by the Baltimore & Ohio.

Reynolds Mining Corp., a subsidiary of Reynolds Metals, has leased nearly 2,000 acres of coal-bearing government land in Wyoming's Lake DeSmet area. Reynolds bid $1 an acre. Under agreed terms a royalty of 10c a ton will be paid the government for coal mined during the first 10 yr. In subsequent years the government will receive 12c for 5 yr, 15c for the next 5 yr. The terms also call for the company to spend $100,000 on improving the land.

Two coal companies and one manufacturing company closely linked to the coal industry, have been certified as "Excellently Managed" by the American Institute of Management. The two coal companies are the Pittsburgh Consolidation Coal Co. and the M. A. Hanna Co. Joy Mfg. Co. was the third organization named. Pitt Consol and Joy received the award for the sixth consecutive year, M. A. Hanna for the fifth consecutive year.

(Continued on p 148)

MEETINGS

American Institute of Mining Engineers; annual meeting, Feb. 20-23, Hotels New Yorker and Statler, New York, N. Y.

Colorado School of Mines; Symposium on Rock Mechanics, April 23-25, Golden, Colo.

American Mining Congress; Coal Convention, May 7-9, Hotel Netherland Plaza, Cincinnati, Ohio.

Bluefield Coal Show, May 23-25, N&W Terminal, Bluefield, W. Va.

Rocky Mountain Coal Mining Institute; 52d regular meeting, June 17-20, Hotel Colorado, Glenwood Springs, Colo.

National Coal Association; Convention, June 13-14, Shoreham Hotel, Washington, D. C.

BUILT FOR ROCK-HARD ROAD WORK

The Allis-Chalmers HD-21 is a Real Miner's Tractor

Chiseling an access road through rock demands "something extra" in crawler tractor performance and durability, yet it's the kind of job any miner's tractor may be required to do.

Conditions like this call for an Allis-Chalmers HD-21. Its 204-hp Allis-Chalmers engine is noted for its ability to perform with a minimum loss of efficiency even after thousands of hours of operation. Torque converter drive multiplies torque up to 4½ times . . . develops 41,500 lb drawbar pull at low speeds . . . cushions the entire power train against load shocks.

New Tru-Dimension tracks bring a new high in track durability. Thousand-hour lubrication intervals save maintenance time. Positive seals protect idler, support roller and truck wheel bearings from abrasive wear as no other seals can.

Ask your Allis-Chalmers dealer to show you the many other features that make the HD-21 a natural for rock-hard assignments.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN



ALLIS-CHALMERS

AKINS 1st in EXPERIENCE

with Spiral Separators for Heavy Media

1908... THE FIRST AKINS

Colorado Iron Works made the first Akins Spiral Classifier in 1908. Its outstanding success led to many profitable applications and to Akins leadership in the field of classification.

1938... HEAVY MEDIA

Experimentation on the use of Akins Spiral Classifiers in making a sink and float separation was first started in 1938. Continuous research, on pilot plant and commercial scales, resulted in development of the Akins Separator... a modification of the classifier which retains all of the important mechanical features of the Akins. In 1944 the first 78" Akins Separator was placed in successful operation by one of the large iron mining companies, followed in 1948 by a unit of the same size in a large West Virginia coal cleaning plant.



1956...

This Akins Separator is making a 3-product separation, requiring only one media circuit. The Akins Separator, permitting extraction and blending of middlings with either float or sink, makes it possible to improve both grade and recovery and produce two types of coal from the same seam... one a high grade for domestic and industrial uses and one a high-ash product for large steam plants.

PROVED FACTS ABOUT AKINS SEPARATORS

• 3-product separation in one machine, requiring only one media circuit. • Start-up under full load. • Entire vessel is visible and accessible. • Variation in rate or grade of feed is not detrimental. • Large pool area and volume minimize tramp refuse in the product and facilitate better recovery of values from fine sizes • Gradation of gravity and viscosity from feed entry point to sink removal point provides natural cleaning of sink, and allows circulation of media at lower gravity and viscosity.

You can have the advantage of this AKINS EXPERIENCE... *JUST WRITE, WIRE or CALL*

Akins — the ORIGINAL spiral type classifier.

COLORADO IRON WORKS CO.

1624 17th Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

Sales Agents and Licensed Manufacturers in Foreign Countries

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.

News Briefs (*from p 146*)

A new set of lighting standards has been devised by the U. S. Bureau of Mines for underground coal mines. Interior Secretary, Douglas McKay has hailed the standards as "a significant contribution to coal mine safety." Prior to the announcement, the Bureau had approved only battery-powered portable lamps and mining equipment headlights in gassy or dusty coal mines. The new lighting standards permit construction of equipment drawing power directly from mine circuits.

Fire has destroyed a tipple and processing plant owned by the Clinchfield Coal Co. at its Splash Dam mine, Haysi, Va. The fire broke out on the first day the company had reactivated the mine. Damage was estimated at $450,000.

A $16,000,000 expansion program in 1956 to increase production of industrial gases is being planned by Air Reduction Sales Co., New York, N. Y. Three new producing plants are scheduled for completion this year in Chicago, Ill.; Alton, Ill.; and Calvert City, Ky. Producing facilities will also be installed at Butler, Pa., and Riverton, N. J. The Butler and Riverton plants are the largest "Airco" plants producing liquid and gaseous oxygen.

The Peabody Coal Co. has acquired the Buckskin mine of the Wasson Coal Co., Boonville, Ind., and land adjoining the mine. The property borders the Tecumseh mine owned by Peabody.

Nearly a year ago the Emerald Coal & Coke Co., Brownsville, Pa., closed down its bee hive coke ovens in Allison, Pa. Last month the company was preparing to put some of them back into operation. The company began cleaning 400 ovens and will fire them all if the demand for coke continues, according to a company spokesman.

As demand for steel outran supply last year steel companies began reactivating some of their oldest facilities. Among them was one of the company's oldest blast furnaces, the 113-yr old Mary furnace of the Sharon Steel Corp., Lowellville, Ohio. It was taken out of mothballs after being inactive for one year.

The nation's 1,206 steelmaking furnaces smelted some 117,000,000 net tons last year, a new world record. The previous record, 111,609,719, was set in 1953. Observers expect that the latest record will be met or exceeded during 1956.

Beckley Memorial Hospital, Beckley, W. Va., the biggest of 10 hospitals being built by the United Mine Workers of

(*Continued on p 150*)

How Princess Elkhorn Coal Company

Simplifies and Saves

with GULF MINING MACHINE LUBRICANT



Princess Elkhorn Coal Company of David, Kentucky, has used Gulf Mining Machine Lubricant for over seven years to eliminate costly extras at the face. It lubricates the Joy cutters, loaders and shuttle cars, that are specially built to work in 36-inch coal.

Extra steps, extra applications, and extra handling cost money. Princess Elkhorn Coal Company has found it can eliminate these costly extras with Gulf Mining Machine Lubricant. This cost-saving lubricant does the entire lubricating job at the face, thus simplifying lubricant storage and handling. It also lessens the danger of application errors. Thus this progressive company avoids the extras—does the job with one grease.

Gulf Mining Machine Lubricant not only replaces several other lubricants, but does a better job because of its heavy body, excellent adhesiveness, and resistance to the washing action of water. You will find that it provides effective protection for plain and antifriction bearings, crawler mechanisms, and gear boxes.

A Gulf Sales Engineer is as near as your telephone. Consult the telephone directory for the number of your local Gulf office and have him demonstrate the many time-saving, cost-cutting advantages of Gulf Mining Machine Lubricant on your equipment.

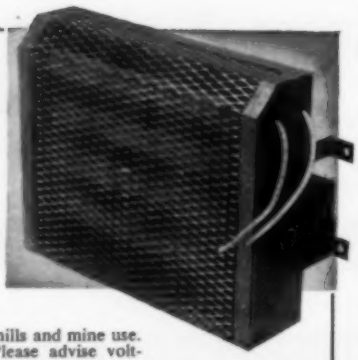
GULF OIL CORPORATION • GULF REFINING COMPANY

1822 Gulf Building, Pittsburgh 30, Pa.

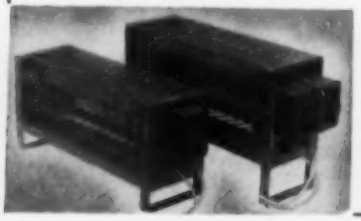
GULF

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

GUYAN HEATER UNITS FOR INDUSTRIAL APPLICATIONS



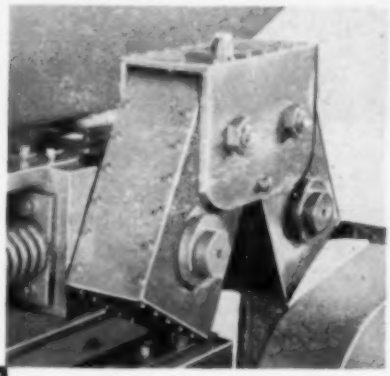
•Guyan natural convection heater answers the problem of small, hard to heat places (such as locomotive cabs, crane cabs, pump houses and small offices) requiring a dependable, long life heater.
Consisting of corrosion resistant aluminum chromium alloy wire wound on ceramic forms and mounted within expanded steel housings, these heaters can be furnished from 1500 watts thru 7500 watts for 110, 220, 250, 440, 500 volts DC or AC, single or three phase.
The illustrations show the wall and floor type heaters furnished either with or without switches.
Guyan heaters are designed to withstand the hard service and abuse that is commonly experienced in industrial mills and mine use.
Please advise voltage, wattage required and type heater when ordering or requesting quotation.
For larger areas the Guyan Forced Convection Heater is recommended. These heaters are furnished from 4000 watts thru 15000 watts.
Guyan Forced Convection Heaters are manufactured with a heavy duty silent propeller type fan incorporated into the design of the heater. Prices furnished on request.



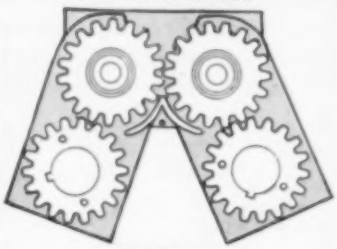
GUYAN
MACHINERY COMPANY
LOGAN • WEST VIRGINIA

the Famous
GUNDLACH GEAR BOX

One of the many features that make Gundlach Crushers REQUIRE LOWEST H. P. PER TON OF CRUSHED COAL!



CASING REMOVED



SELF-CONTAINED
OIL SPLASH SYSTEM

Unique design keeps gears in mesh at all times . . . therefore keeps crusher rolls in perfect timing and allows you to change material size while machine is running.



226 CENTREVILLE AVE.
BELLEVILLE, ILLINOIS
DIVISION OF J.M.J. INDUSTRIES

T. J. GUNDLACH
MACHINE COMPANY

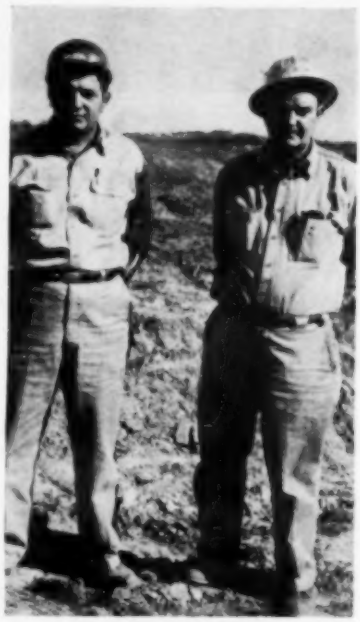
News Briefs (*from p 148*)

America, was opened last month. The $3,300,000 structure was the third in a 3-states chain to be opened by the Miners' Memorial Hospital Association of Kentucky, a UMWA Fund subsidiary. Equipped with 207 beds the hospital will cater to miners from southern West Virginia and is intended by the UMWA to be primarily a hospital for welfare and retirement fund beneficiaries.

The U. S. Bureau of Mines reports that 32,223 tons of anthracite was carbonized by the coke manufacturing industry during November. Although the tonnage was nearly 3,500 tons less than October's 35,626 tons, it was 72% more than the amount of coke manufactured during November of 1954. The USBM also reports that the coking industry used 319,644 tons from January to November, 1955. This was a gain of 110,044, or 53%, over the corresponding months in 1954.

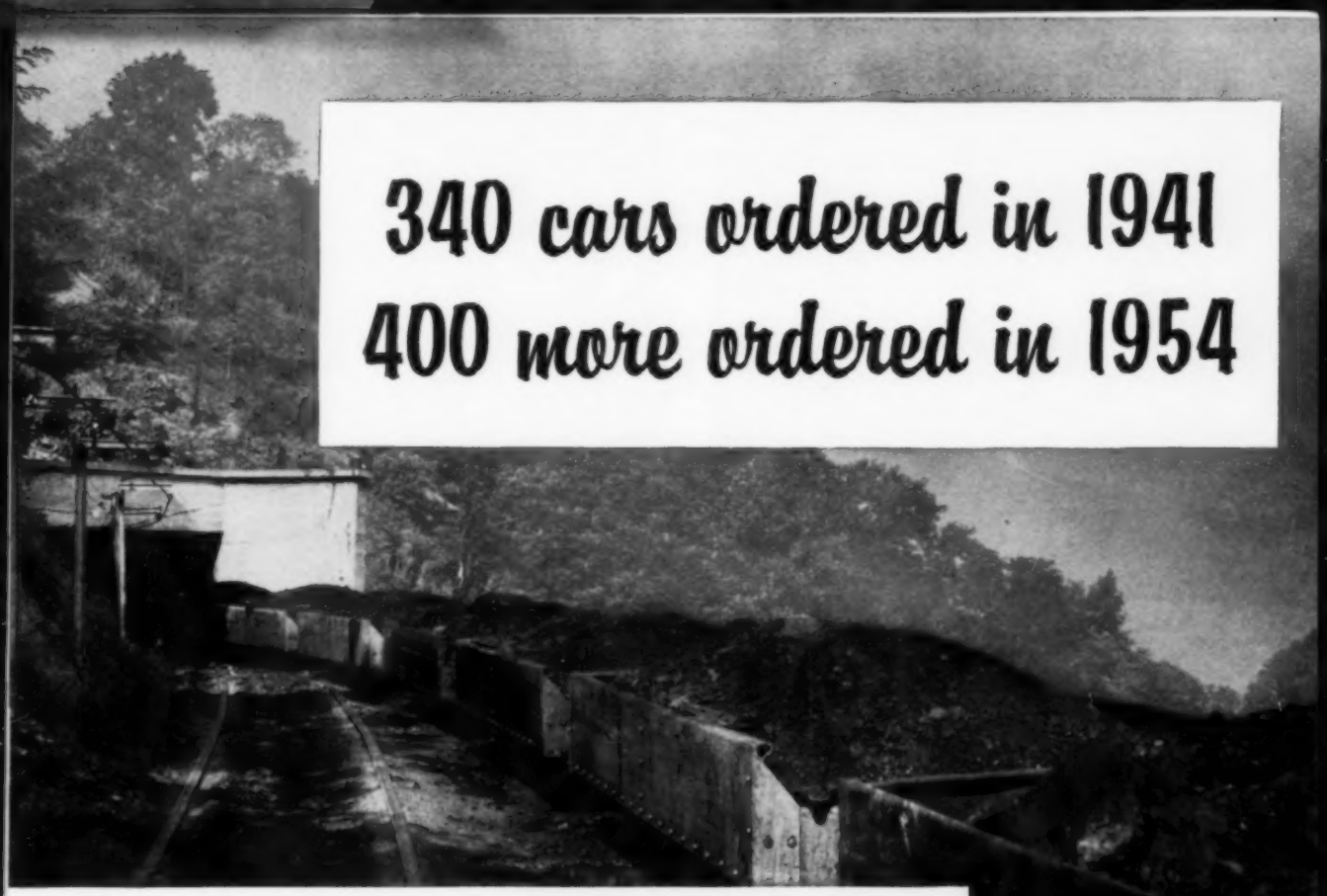
The Clearfield office of the Pennsylvania State Employment Service says that the demand for qualified deep-mine men has increased to such a point that it is difficult to find applicants.

A move by a Pennsylvania company, the Scranton Spring Brook Water Co., to import natural gas into the anthracite region of Pennsylvania has been met with
(*Continued on p 152*)



COAL MEN ON THE JOB . . .

DELTA COLLIERIES, INC., Delta mine, Marion, Ill.—Clyde Dallas (left), blasting foreman, and Maurice Williams, superintendent.



340 cars ordered in 1941
400 more ordered in 1954

There's no testimonial like a repeat order—

Back in 1941 a large West Virginia mining company bought 340 5-ton mine cars from A. C. F. Industries, Incorporated. These cars built with USS COR-TEN Steel have been in *continuous operation* for thirteen years, and are still in good operating condition. Because of this excellent service the mining company recently purchased 400 more . . . to be built with USS COR-TEN Steel.

Mining equipment gives extra long service when it is built with USS High Strength Steels—COR-TEN, MAN-TEN and TRI-TEN. That's because these famous steels have a 50% higher yield point, and offer greater resistance to wear, fatigue, abrasion and impact than carbon steel. Mine cars, draglines, 'dozers and buckets made with USS High Strength Steels can work hard and fast to boost production. They stay out of the repair shop, too.

You can use USS High Strength Steels in direct replacement of plain carbon steel in many parts of your mining equipment — to increase strength and durability *without* increasing weight. Or, these tough, strong steels can be used in thinner sections: (1) to reduce equipment weight without reducing its strength; (2) to increase the size and capacity of equipment, without increasing the total weight or the power needed to move it.

And USS High Strength Steels have other special advantages. If your mining equipment must operate in sub-zero temperatures, must handle highly abrasive materials or work in unusually corrosive atmospheres you can build it with the USS High Strength Steel that offers high resistance to these destructive forces. The result—your equipment stays in productive operation and requires less maintenance and repairs.

For more information or application data concerning USS High Strength Steels call or write our nearest office.

NOW AVAILABLE

Our new "Design Manual for High Strength Steels" is ready for distribution. This excellent book contains comprehensive and practical information that you will find extremely useful in designing your product for greater economy and efficiency by the sound use of high strength steels.

For your free copy, write on your company letterhead giving your title to United States Steel Corporation, Room 5192, 525 William Penn Place, Pittsburgh 30, Pa.

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS HIGH STRENGTH STEELS

USS

S-422

UNITED STATES STEEL

News Briefs *(from p 150)*

a vigorous protest by a United Mine Workers vice president. In a speech at Hazleton, Pa., Thomas Kennedy said the miners' organization will "have our legal department proceed to present a formal protest." He added: "It is a sad commentary for the water company that has been earning big money by supplying collieries and miners' homes with water to bring a competitive fuel into the anthracite region."

A bill that would authorize the federal government to assist states with the costs of flushing mine voids has been introduced in the House of Representatives by Congressman Daniel J. Flood (D-Pa.). Rep. Flood's own state of Pennsylvania is considering an expenditure of $5,000,000 to flush old mine workings. His federal bill would authorize the government to match the $5,000,000 and assist Pennsylvania in carrying out the program.

Some $98,000 has been made available by the Public Health Service, Department of Health, Education and Welfare, for research in air pollution projects. The project's staff, headed by T. Reed Scollon, will inspect industrial stack samples.

Foreign News *(from p 128)*

was estimated at 57,355,000 tons, Mr. Cadel said. He concluded that the Coal Board anticipated an increase in production of 2,000,000 tons in 1956.

WEST GERMANY

West German hard coal production in 1955 was expected to amount to 130,500,000 tons against 128,000,000 tons in 1954, according to the Coal Industry Association. Production per working day fluctuated last year, with a decline in summer and October and November, chiefly because of a lack of coal miners. An increase to about 450,000 tons in December was the highest reached since the war.

LUXEMBOURG

Member countries of the European Coal and Steel Community produced 20,614,000 tons of coal in November, according to officials figures published by the High Authority. This compares with 21,209,000 tons in October and 20,557,000 tons in November, 1954. The Community's output in the first eleven months of 1955 amounted to 224,998,000 tons, compared with 220,823,000 tons in the same period of last year. Details were as follows by countries (in 000's of tons): West Germany, 10,989; Belgium, 2,557; France, 4,577; The Saar, 1,405; Italy, 91; The Netherlands, 995.



AKREMITE
prepared with M-1 BLACK

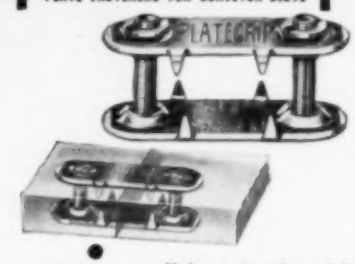
assures efficient, safe and economical results in strip mining. Millions of pounds have been shot to date without misfire or accident.

For perfect AKREMITE results, M-1 BLACK *is the carbon to use.*

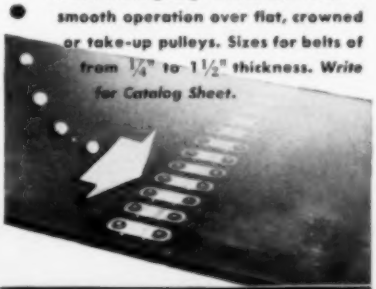
Samples and Technical Data Furnished on Request to Licensees

R. T. Vanderbilt Co., INC. 230 Park Avenue • New York 17, N. Y.

PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS



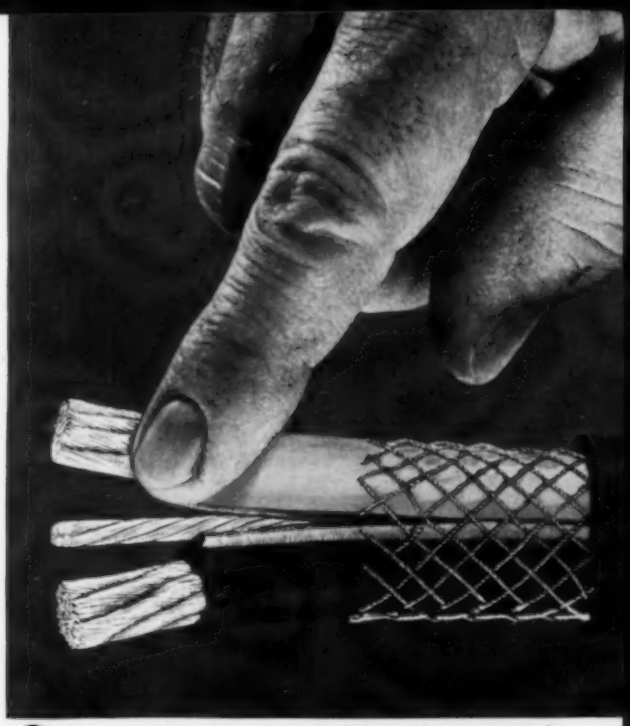
Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from ¼" to 1½" thickness. Write for Catalog Sheet.



ARMSTRONG BRAY & CO.
5340 Northwest Highway, CHICAGO 30, U. S. A.



1 **New neoprene insulation compound** gives Securityflex cable physical toughness on the INSIDE as well as the outside . . . resistance to puncture, flame and crushing.



2 **New flat stranding of grounding conductor** prevents broken wires – thus assuring continuity of operation. Full 50% wire gives peak electrical protection.

2-YEAR STUDY GIVES YOU A

New Triple Protection

shuttle car cable

Before designing the new Securityflex* cable, Anaconda engineers checked thousands of shuttle car cables of all makes to see why they failed.

They found the jacket often looked fine, but constant bending, flexing or excess tension had broken insulation or snapped conductors. To combat cable "heart failure"—Anaconda's new Securityflex cable provides *triple protection inside* to match tough outer strength.

3 New Advantages

1. Rugged high-grade neoprene insulation greatly increases resistance to puncture, flame and crushing.

2. Improved stranding of ground and power conductors prevents broken wires—assures continuity of ground.

3. Nylon breaker strip increases short circuit protection. Nylon jacket reinforcement also adds to cable strength and prevents wicking of moisture.

Full 50% Grounding Wire

In addition—full, 50% grounding wire insures greater electrical protection, longer life, and extra safeguard against excess tension. Anaconda's flat, service-proven grounding wire allows more cable on reel—will not cut insulation if cable is crushed by runovers. Millions of feet of new Securityflex have been sold without a reported failure of grounding conductor. Insist on full-size grounding conductor for safety.

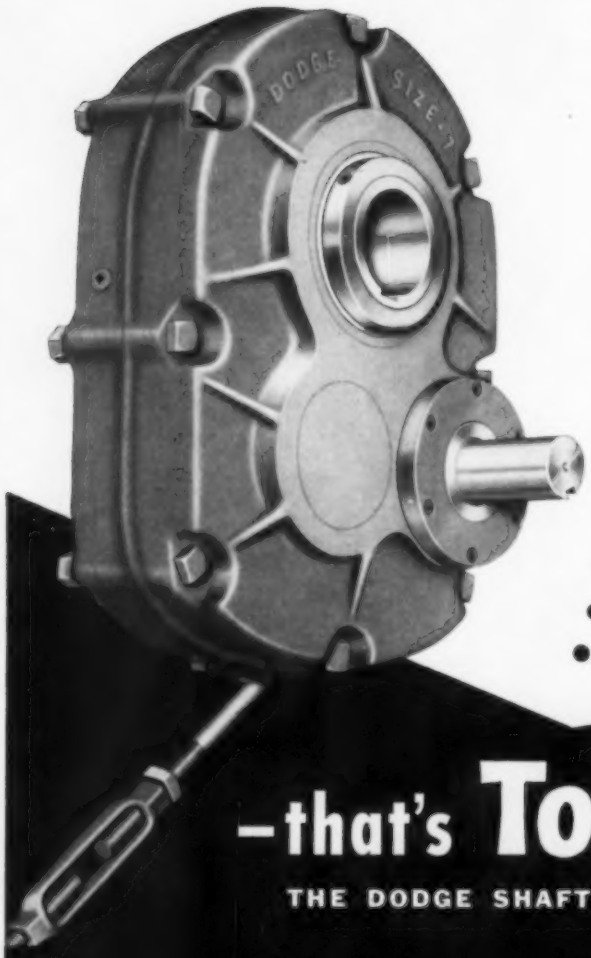
Ask the Man from Anaconda or your distributor for details. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Reg. U. S. Pat. Off. 56340



3 **New nylon Anti-Short Breaker Strip*** gives Securityflex amazing crush resistance . . . minimizes short circuits between conductors even under heavy impact.

ASK YOUR ANACONDA® DISTRIBUTOR FOR MINE CABLE



97% EFFICIENCY

- NO FOUNDATION
- NO FLEXIBLE COUPLING
- NO SLIDING BASE
- NO LINING UP PROBLEM

—that's Torque-Arm

THE DODGE SHAFT-MOUNTED SPEED REDUCER

Proved in tens of thousands of installations, in all types of industry, this new and better kind of speed reducer delivers up to 97% efficiency . . . makes savings up to one-third!

Mounted directly on the driven shaft, the reducer is anchored by the Torque-Arm, fastened to any fixed object. No need for foundation, flexible coupling or sliding base. No lining up difficulties. Unit is driven through any V-belt drive. Stock Taper-Lock Sheaves prescribed for each job. Tri-Matic Overload Release and Backstop available if desired.

Dodge Torque-Arm is America's most complete line of shaft-mounted speed reducers — single and double reduction series—capacities from 1 hp to 60 hp; output speeds of 12 to 365 rpm. Sold from Distributors' stocks.

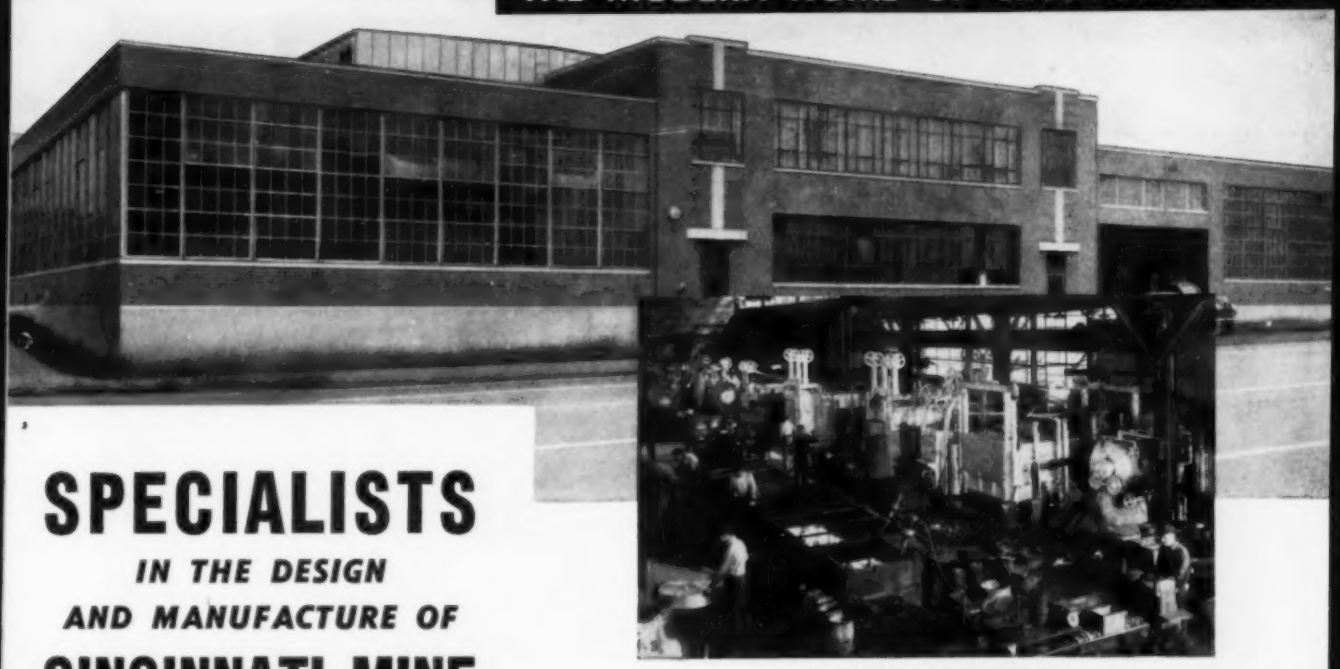
DODGE MANUFACTURING CORPORATION
3000 Union Street, Mishawaka, Indiana

Call the Transmissioneer, your local Dodge Distributor. He can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.



DODGE
of Mishawaka, Ind.

THE MODERN HOME OF CINCINNATI BITS



SPECIALISTS

IN THE DESIGN
AND MANUFACTURE OF

CINCINNATI MINE WORLD FAMOUS BITS

The design and manufacture of Cincinnati Bits is and has been a SPECIALIZED BUSINESS with CINCINNATI MINE for more than a quarter of a century. Today in this modern plant with its own heat treating department is manufactured the world's most complete line of bits. CINCINNATI MINE with its highly skilled personnel in design, research and heat treating has worked closely with mine operators all over the world to produce a broader line of bits for every cutting condition. Remember, whatever your cutting problem, CINCINNATI MINE has the experience and know-how plus the facilities to give you the type of bit that will provide you with maximum cutting efficiency at the lowest possible cost.

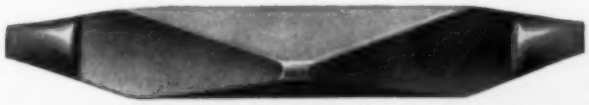
HEAT TREATING DEPARTMENT



DUPLEX C-11 . . . for all-purpose cutting, this bit offers the best obtainable value in cutterchain bits. Available in various grades . . . is reversible and double-ended . . . has sharp points . . . keen cutting edges . . . long life . . . locks securely . . . easily removed.



DUPLEX F TYPE . . . PLAIN . . . this bit gives you dependable service under the toughest cutting conditions (where other bits have failed) due to its specially reinforced tip which provides a stronger cutting point.

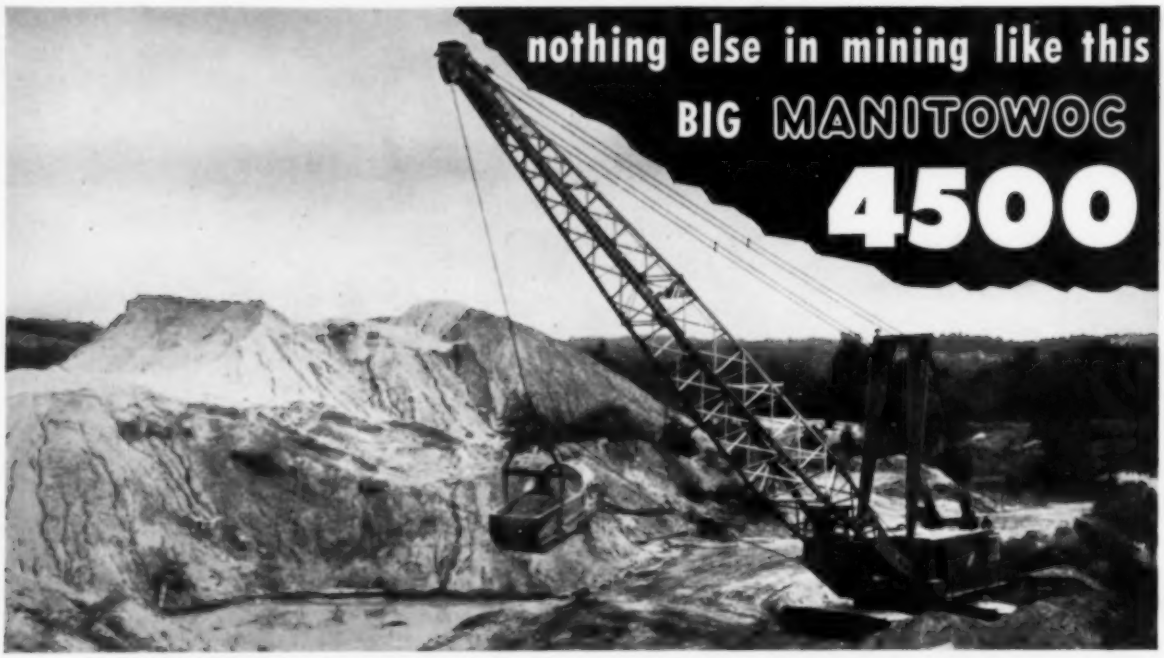


DUPLEX F TYPE TIPPED BIT . . . where cutting conditions are favorable to tipped bits . . . Cincinnati's exclusive tipping process makes this the lowest cost throw-away type carbide tipped bit available.

BITS FOR EVERY CUTTING JOB

Illustrated here are just three of the more popular bits in the DUPLEX FAMILY. Not only do we offer a complete line of all types of bits but each type is made in numerous grades to give you the best bit for your particular cutting conditions.

the **CINCINNATI MINE MACHINERY CO.**
CINCINNATI 25, OHIO



Little downtime with great capacity is the record set by this 4500 dragline mining limonite ore for U. S. Pipe and Foundry Company near Russellville, Ala.

There's no place for undersized, underpowered mining machines when you're aiming for more production per man hour. That's why the husky Manitowoc 4500 is today's "greater output" champ among mining operators.

United States Pipe and Foundry Company of Birmingham, Ala., use two 4500 draglines equipped with 140′ booms and 4 yd. buckets for mining limonite ore. Satisfactory performance from three Manitowoc 2-yd. shovels led to their choice of the larger 4500 machines. Top capacity with little downtime for all five units, is due to Manitowoc's simple design and superior construction.

TOP DESIGN FEATURES MAKE A TRUE MINING MACHINE

GREATER SIMPLICITY OF DESIGN directs more power to the dipper or bucket. Only four main shafts — only 15 gears — only working gears turn.

GAS OR DIESEL UNIT DRIVE effectively utilizes power — eliminates thousands of electrical wires and components. Full power can be applied to any operating function with less dead weight than is found in electric machines. Greater mobility — no restrictive electrical cables.

EXCEPTIONAL STABILITY assures top capacity. Massive carbody, adequate counterweight and long, wide crawlers let you reach way out with full safety and low ground bearing pressures.

SPECIAL HI-LIFT SHOVEL BOOMS available in two lengths — 60′ boom with 45′ tubular stick and 50′ boom with 37′ stick.

POWER-SMOOTH TORQUE CONVERTER, pioneered in power shovel application by Manitowoc, multiplies engine torque three times. Efficiency is increased and engine life extended. With engine power balanced to the load, engine **cannot stall — cannot be overloaded.** Make the Manitowoc 4500 your next mining machine. Send today for your **free** copy of the new 20 page Model 4500 illustrated catalog — no obligation!



Air-operated controls and clear, unobstructed view from large comfortable cab help 4500 operator do a better job.

MANITOWOC
SHOVELS 1-5½ YD. Speedcrane CRANES 20-100 TON

MANITOWOC ENGINEERING CORP.
Manitowoc, Wis.

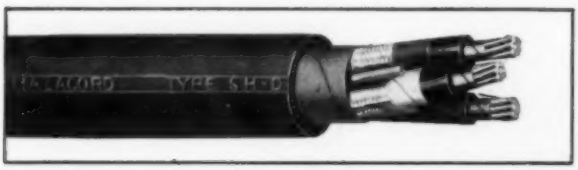
the care and feeding of electric shovels



Nothing brings out the beast in an electric shovel more than getting it "off its feed." Deprive it of a steady diet of electricity, and it will drop its ugly head and go temperamental on you.

Sensible, well-trained shovels insist on Hazacord Portable Cables for dependable power supplies. They know Hazacord Shovel Cables are electrically and mechanically strong to withstand all rugged mining service as well as approved for flame-resistance under the rigid requirements of the Federal Bureau of Mines and the Pennsylvania Department of Mines.

Hazacord Shovel Cables are available in six standard types for use up to 15,000 volts. They are protected by a Hazaprene



ZBF sheath which has been cured in a continuous metal mold to assure: *1. optimum vulcanization; 2. maximum density; 3. lasting toughness; 4. smooth, wear-resisting surface; 5. controlled diameter; 6. resistance to mechanical abuse.*

Keystone heat-, moisture- and ozone-resisting insulation provides maximum electrical protection, and extra-flexible conductors insure easy, kink-free handling and added service life under constant flexing.

Write for your copy of the Hazard Mining Cable Catalog, Bulletin H-450, and check over the Hazacord construction that will keep your mining machinery contented. Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.



HAZACORD

mold-cured portable cable

PRODUCT OF OKONITE RESEARCH

2417



BETTER FRAGMENTATION produced by new Akremite process permits stripping units to move 25% more material.

Blasting Costs Cut 50%, Stripping 25% More Efficient, with New Akremite Method

Spencer prilled Ammonium Nitrate is key ingredient in new "make-it-yourself" explosive

By F. M. Robertson, Supt., DeBardeleben Coal Corporation

During one year of testing Akremite, the new "make-it-yourself" explosive, we of the DeBardeleben Coal Corporation at Sipsey, Alabama, have had the following experiences:

(1) We can cut blasting costs as much as 50%. (2) Better fragmentation permits stripping units to move 25% more materials per hour. (3) A dramatic series of tests has proved that Akremite is one of the safest possible explosives.

This simple but revolutionary new explosive is the brainchild of R. L. Akre, superintendent of drilling at Maumee Collieries Co., Terre Haute, Ind., using prilled Ammonium Nitrate produced by Spencer Chemical Company.

Ammonium nitrate by itself is not an explosive. But it was Akre's idea to mix ammonium nitrate with carbon black and pack it in a polyethylene bag. When the bag is confined in a drill hole and detonated with a high gelatin dynamite and primacord, it produces a tremendous explosion. Because the mixing operation is so simple and safe, it can be done right at the mine location.

To find out how safe Akremite actually is, we asked Southern Research Institute at Birmingham to put the new explosive through a series of tests. The testers fired bullets into bags of freshly made Akremite. They also conducted the regular pendulum-friction and modified propagation-through-air tests.

No explosions, fire, or crackling resulted from any of these tests, although the rifle-bullet impact test on dynamite produced four violent explosions out of four trials.

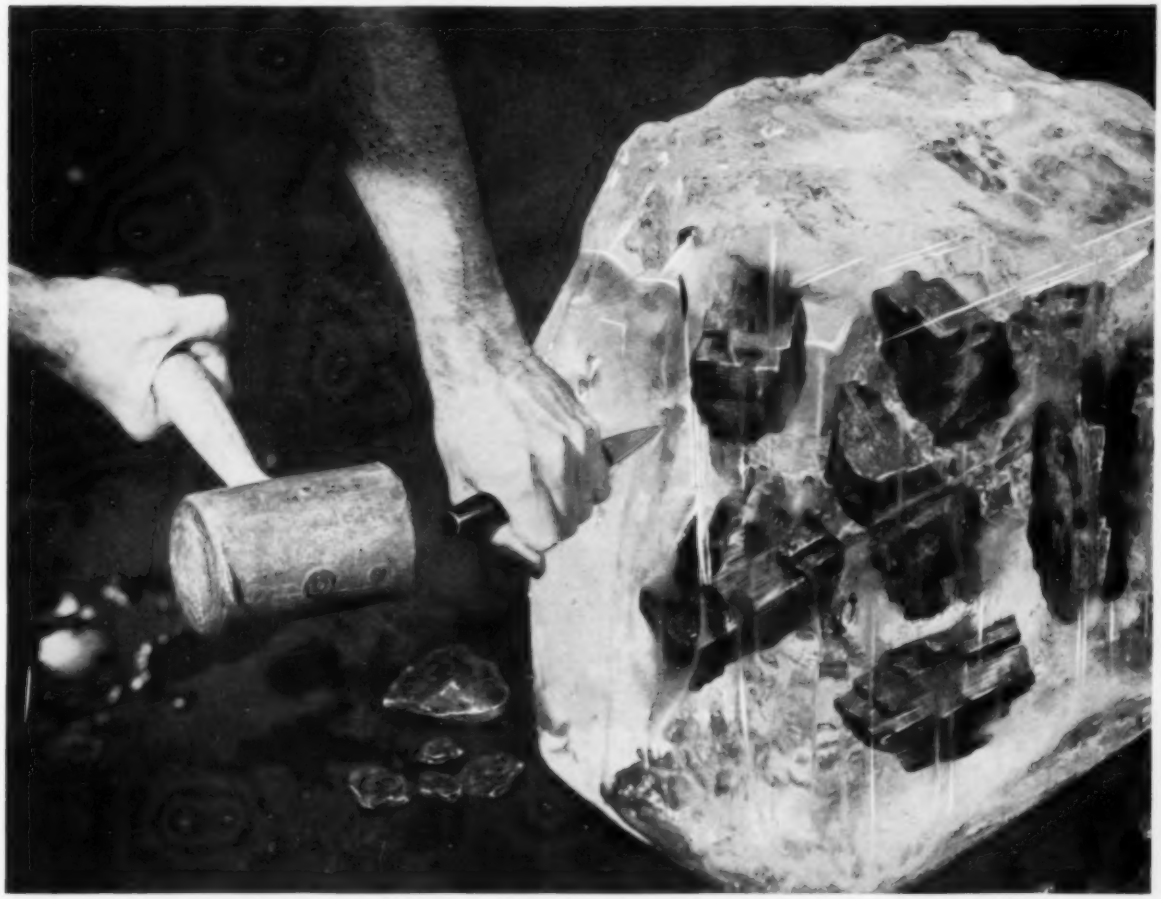
Simpler, safer, cheaper, better, Akremite is fast becoming the favorite explosive for strip mining.

(NOTE: Spencer Chemical Company will be happy to provide you with further information about the Akremite Method as discussed by Mr. Robertson.)

SPENCER CHEMICAL COMPANY

610 Dwight Building • Kansas City 5, Mo. • BAltimore 1-6600

Frozen Coal – Hard to Handle but easy to prevent!



Freezeproof your coal with Morton "Formula 5"

There's no need for your customers to spend money unloading frozen coal. It's easy to keep your coal free-running . . . keep your customers happy . . . by using Morton "Formula 5", the inexpensive freezeproofing compound made exclusively for the coal industry. Effective even at sub-zero temperatures, "Formula 5" ends costly delays in unloading frozen coal . . . saves your customers time, labor and money.

Morton "Formula 5" is economical to apply. It needs no mixing, no extra handling. It's a free-pouring, dry product composed of sodium chloride (30-70 mesh) and a special anti-corrosive compound. Just apply dry, direct to coal.

"Formula 5" gives you these extra benefits:

• Low cost of application • Scientifically treated to produce an ideal dissolving rate and minimize loss during initial draining • Will not lump in feeder • Contains a rust inhibitor to protect your equipment • Harmless to coal, harmless to hands and clothing • Can be used for conveyor equipment, switches, tracks, etc. • Readily available—comes in tough, 100-lb. bags.

Send for more FORMULA 5 information today!

MORTON SALT COMPANY
INDUSTRIAL DIVISION
Dept. CA-256 Chicago 3, Illinois



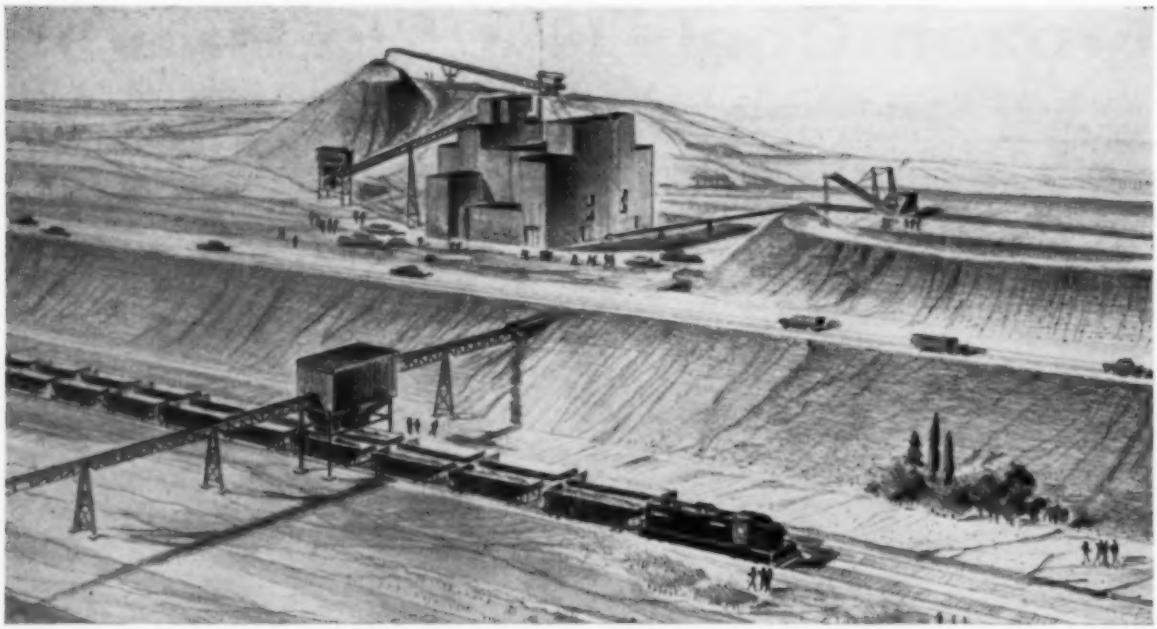
Please send me your free booklet, "The Key to Low Cost Freezeproofing Application."

*Name*_____

*Company*_____

*Street*_____

*City*_____ *Zone*_____ *State*_____



expanding the West Kentucky coal field--

The new Pittsburg and Midway Coal Co. Dekoven mine, Dekoven, Ky., will provide a new source of fuel for the growing number of large coal consumers along the waterways of the Mid-West.

For this mine Roberts and Schaefer Company has engineered the preparation plant, designed and equipped to meet the standards required for the new market. Into the preparation plant has gone the skill and experience gained by this organization during more than fifty years of close co-operation with the coal mining industry.

Supplementary equipment includes raw and clean coal storage, and facilities for rail and water shipment.

Roberts and Schaefer experience is not confined to modern cost-saving coal preparation plants alone but includes a wide variety of installations for water supply, sewage treatment and disposal, and many different types of buildings. Consult our experienced engineers, without obligation, on all your requirements.

ROBERTS and SCHAEFER COMPANY

Subsidiary of Thompson-Starrett Company, Inc.

ENGINEERS and CONTRACTORS

130 North Wells Street, Chicago 6, Illinois

New York 19, N. Y.—254 West 54th Street • Pittsburgh 22, Pa.—1315 Oliver Building • Huntington 9, W. Va.—P. O. Box 570

Hibbing, Minn.—P. O. Box 675

....all in a day's work!



BECAUSE THE PAGE AUTOMATIC BUCKET IS BUILT FOR THE JOB!

After 8 years the bucket shown in the photo above is still on the job and going strong. The "RH" class is designed for digging in blasted rock, shale, compacted gravel, and hardpan, so we give it ample weight to insure penetration, and heavy toothpoints mounted in bases cast integral with the high-manganese steel lip to withstand the abrasion and strain it is expected to meet. Other standard classes available are the "RC" general purpose, "RM" medium, and "RL" light. Write Dept. "E" for bulletin GPB 454.

Page Engineering Company has designs, facilities, and experience, to build special purpose buckets such as slat — trenching — levee — and vee bottom to meet YOUR needs. Capacities — ⅜ to 40 cu. yds.

Page

Automatic Dragline Buckets

Walking Draglines

If it's a Page... It DIGS

PAGE ENGINEERING COMPANY - CLEARING POST OFFICE - CHICAGO 38, ILLINOIS

"CONTINUOUS" HAULAGE

FOR "CONTINUOUS" MINING



ENTERPRISE HAULAGE EQUIPMENT

MINE CARS (4-Axle Cars, Thru-Axle Cars, 8-Wheel Cars)

- End Dump Cars
- Side Dump Cars
- Bottom Dump Cars
- Rotary Dump Cars

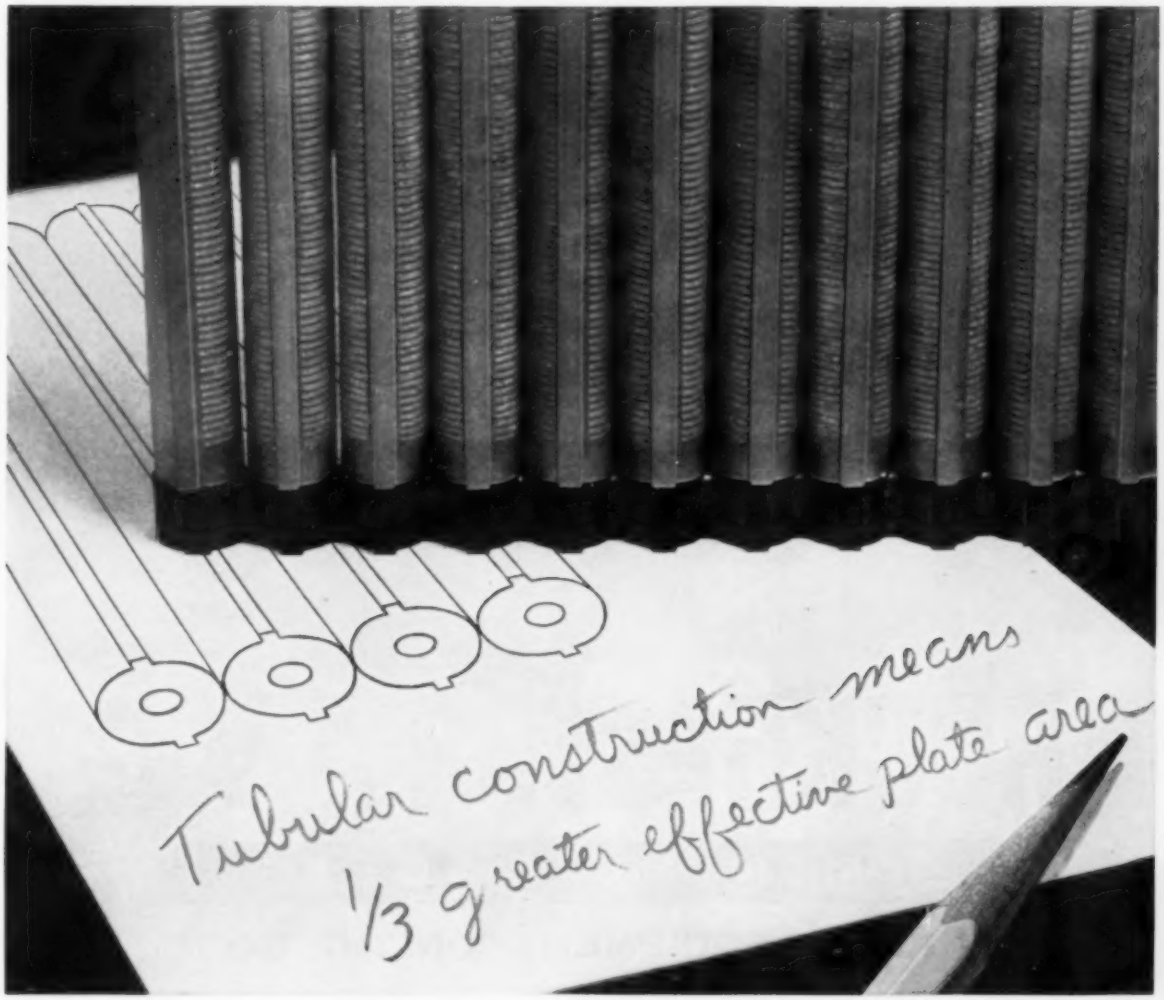
EQUIPMENT HANDLING CARS
MAN-TRIP CARS

"Your cars custom-engineered for your specific needs"

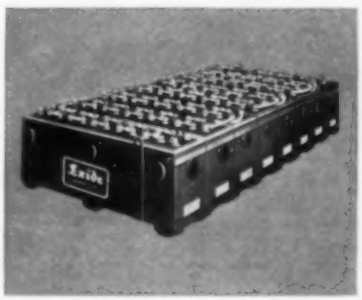
ENTERPRISE WHEEL & CAR CORPORATION

BRISTOL, VA.-TENN. • HUNTINGTON, W. VA.

EXIDE-IRONCLAD BATTERIES



Greater effective plate area boosts power for peak loads



BATTERY FOR MINING LOCOMOTIVE, Model MVM. Specially designed to fit space provided on locomotive. Has tubular construction of positive plates, Silvium grids, "Permanized" negative plates, extra heavy connectors, and all other Exide-Ironclad advantages that mean power to spare in heavy duty applications. Write for Bulletin 5161.



According to general principles of storage battery engineering, power reserve is governed by positive plate area. In the Exide-Ironclad greater effective plate area is achieved without increasing plate size. Here's how:

In the Exide-Ironclad positive plate, active material is held captive in tubes of slotted polyethylene. These tubes are arranged in a tight row with electrical connections only at the top. The actual surface of the plate is the combined semicircular sides of these tubes—the total surface area being roughly one-third more than the projected dimensions of the plate.

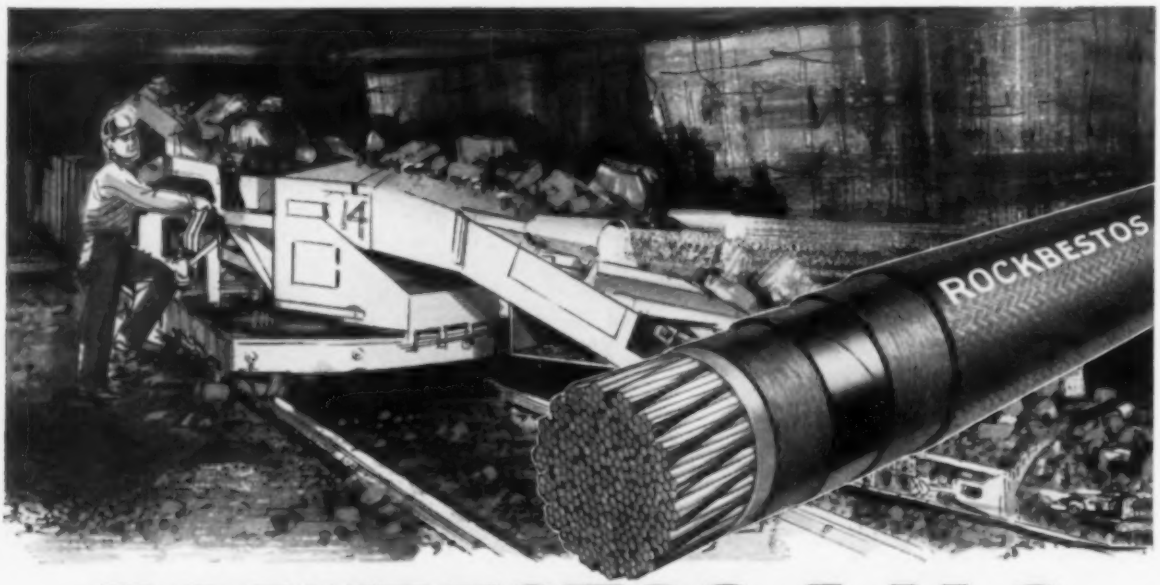
In use, this unique design feature means that more active material is exposed to electrolyte for a given size battery. It means the battery can provide power to spare for peak loads as well as a dependable source of continuous power.

Only Exide-Ironclad Batteries have this advantage. Be sure to specify them when you order—for either new equipment or for replacement. Exide Industrial Division, The Electric Storage Battery Company, Phila. 2, Pa.

Exide®

MECHANIZATION

KEEPS PRODUCTION COSTS DOWN



ROCKBESTOS A.V.C.

MINING CABLE

KEEPS EQUIPMENT "ON THE GO"

Leading mine machinery manufacturers have for years wired their equipment such as continuous miners, loaders, cutters, shuttle cars, locomotives with Rockbestos A.V.C. as standard equipment.

Built to stand up and give the kind of trouble-free performance you need, Rockbestos A.V.C. . . . the felted asbestos wall construction . . . means less equipment down time and lower wire maintenance costs.

Rockbestos A.V.C. won't ignite or carry flame. It remains flexible and won't dry out or crack . . . safely takes conductor heating overloads. It won't bloom or rot when exposed to grease and oil. And it fits bushings right.

When buying new equipment or servicing old . . . be sure . . . specify Rockbestos A.V.C. Mining Cable.

ORDER FROM THESE JOBBERS — SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.	INDIANA, PA.
National Mine Service Co.	National Mine Service Co.
BIRMINGHAM, ALA.	JENKINS, KY.
Moore-Handley Hardware Co.	National Mine Service Co.
BLUEFIELD, W. VA.	LOGAN, W. VA.
Superior-Sterling Co.	National Mine Service Co.
CHARLESTON, W. VA.	LOTHAIR, KY.
Charleston Electric Supply Co.	Mine Service Co.
CLARKSBURG, W. VA.	McCLURE, VA.
Westinghouse Electric Supply Co.	Erwin Supply & Hardware Co., Inc.
COWEN, W. VA.	MIDDLESBORO, KY.
Pennsylvania & W. Virginia Supply Corp.	Rogan & Rogan Co.
ELM GROVE, W. VA.	MORGANTOWN, W. VA.
Pennsylvania & W. Virginia Supply Corp.	Pennsylvania & W. Virginia Supply Corp.
EVANSVILLE, IND.	PITTSBURGH, PA.
Evansville Electric & Manufacturing Co.	Westinghouse Electric Supply Co.
FAIRMONT, W. VA.	SCRANTON, PA.
Fairmont Supply Co.	Pennsylvania Electric Engineering Co.
GREENSBURG, PA.	WHEELING, W. VA.
Westmoreland Hardware Co.	Westinghouse Electric Supply Co.
HARLAN, KY.	WASHINGTON, PA.
Kentucky Mine & Supply Co., Inc.	Fairmont Supply Co.
HUNTINGTON, W. VA.	WILLIAMSON, W. VA.
Banks-Miller Supply Co.	Williamson Supply Co.

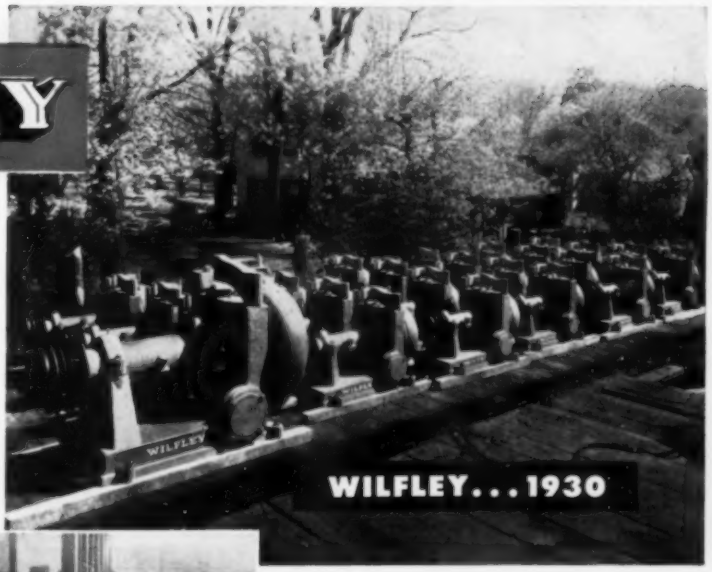
ROCKBESTOS PRODUCTS CORPORATION

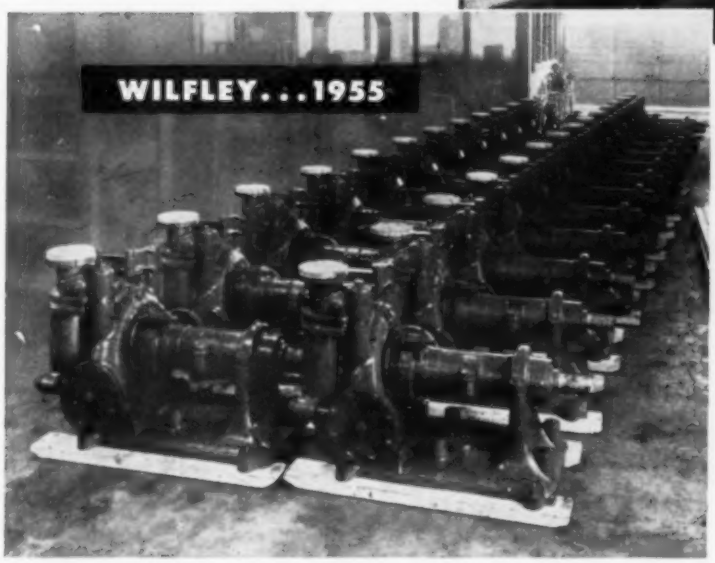
NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS
LOS ANGELES • OAKLAND CALIFORNIA • NEW ORLEANS

WILFLEY

...Advances with the Mineral Industry





Progress in Low-Cost Pumping

Top photo (right) shows part of a large shipment of Wilfley Model "C" Sand Pumps ready for delivery to a large nickel producer.

25 years later this same company still depends on Wilfley for low-cost pumping. Shown in bottom photo is part of a large shipment of Wilfley's new Model "K" pumps on their way to the same customer.

The name Wilfley means continued progress in efficient, economical pumping. Wilfley keeps pace with mineral production throughout the world by designing and manufacturing pumps that definitely deliver cost-saving performance on every application.

Write or wire for complete details on Wilfley Pumps

Wilfley Acid Pump
"COMPANIONS IN ECONOMICAL OPERATION"
Wilfley Sand Pump

A. R. WILFLEY and SONS, INC. Denver, Colorado, U. S. A.
New York Office: 1775 Broadway, New York City

SIMPLEX MINE JACKS

3 HUSKY MINERS

★ Ratchet lowering type for extra safety
★ 5-tons capacity
★ Double-lever sockets permit lifting in close quarters
★ Full capacity on cap OR toe
★ Safety Speed Trigger
★ Ideal for re-railing, repairs, skidding



No. 84A for Thin Seams 14" high, 7" lift

No. 85A for Medium Seams 17" high, 10" lift

No. 86A for Thick Seams 20" high, 13" lift

Hi-Speed TIMBER JACK



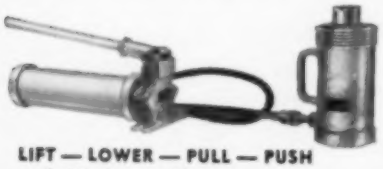
Gear Cover Not Shown

Screw Insures Safety

Bevel Gears and Crank Twice as Fast as Lever Nut Type

MODEL No. 642 LIFTS 6 TONS

Combines safety of screw jack with fast action of crank. Head swivels. Five models with min. ht. from 3'6", max. ht. to 9'6".



LIFT — LOWER — PULL — PUSH
— Safely from a Distance

Re-Mo-Trol hydraulic pump and remote controlled ram and puller works in tight spots—in any position. Ram or puller can be operated from 6' or more away. Models from 10 to 100-tons, from 30-tons with famous Simplex "Center-Hole" for easier, safer pulling.

Write for Bulletin Mines 55 for data on the most complete line of Mine Jacks

WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS

RE-MO-TROL UTIL-A-TOOL JENNY ROL-TOE

TEMPLETON, KENLY & CO.
2501 Gardner Road
Broadview, Illinois

LEADERS SINCE 1883

IN EVERYTHING RELATING TO DIAMOND CORE DRILLING AND SOIL SAMPLING



FOR QUICK ACTION CALL DIAMOND 4-8507 AT SCRANTON

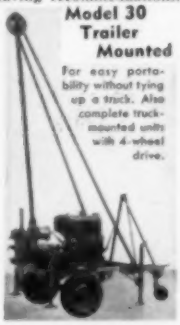
"ORIENTED" DIAMOND BITS CUT FASTER — LAST LONGER

For either core drilling or any other type of diamond drilling, we believe these to be the most efficient and economical diamond bits ever produced and invite inquiries on that basis. Available at no advance in price in a wide variety of types and sizes to meet every diamond drilling requirement. Bulletin No. 320 illustrates all types and gives complete working data. Write for free copy and tell us about your drilling conditions. We welcome opportunities to make money-saving recommendations.

NEW LIGHT-WEIGHT HIGH-SPEED CORE-DRILLING MACHINES

MODEL 30 and MODEL L-2

Supplementing our well-known line of heavy-duty machines for large-diameter and deep-hole drilling we now offer two light-weight high-speed core drilling machines suitable for either Skid, Trailer or Truck mounting. Both models can be powered by either gasoline or diesel engines and air or electric motors. Easily moved from one location to another, they can also be relied upon to produce good smooth cores rapidly at minimum expense. Complete illustrated information furnished on request.



Model 30 Trailer Mounted

For easy portability without tying up a truck. Also complete truck-mounted units with 4-wheel drive.



ACCESSORY EQUIPMENT

STOCKED FOR PROMPT SHIPMENT

We manufacture a wide variety of accessory equipment for diamond drilling and soil sampling and carry all essential items in stock for prompt delivery. A NEW CATALOG, No. 400, not only illustrates and describes each item but also gives piece numbers and shipping weights. Write to day for a free copy; it will help you to save time and money.

CONTRACT DRILLING



For more than seventy years, Sprague & Henwood, Inc. has been a leader in the field of Contract Diamond Drilling and Soil Sampling. During this long period of time our crews have completed thousands of contracts successfully, under every conceivable operating condition. Today, we have a large force of expert operators and an ample supply of modern equipment, so that we can undertake practically any job anywhere, on short notice. Inquiries for all types of contract drilling work are solicited — estimates submitted promptly without charge or obligation.

SPRAGUE & HENWOOD, INC.
SCRANTON 2, PENNA.
NEW YORK • PHILADELPHIA • PITTSBURGH • GRAND JUNCTION, COL. • BUCHANS, NEWFOUNDLAND • EXPORT REPRESENTATIVE, PHILLIPS EXPORT CO., 100 EAST 42nd STREET, NEW YORK, N. Y.



MACHINES BY MARION

A Type 5561 with special long range front end and 40 yard dipper moves a million yards a month in recovering a 48-inch seam in southern Indiana.

MARION POWER SHOVEL COMPANY • MARION, OHIO

NEW SPEED AND DRILLING ECONOMY

Parmanco

Model 51-55 Dual
COAL DRILL



TWO DRILLS IN ONE

"It's a life saver to us"
says W. V. Hartman, Supt. Victoria Coal Corp.

Working ahead of an 8-yard loading shovel in 4-ft. coal, speed is essential.

Traction, hydraulic and electrical system operated by 109 hp engine. Push button controls. Drills can be operated singly or in tandem.

CUTTINGS SHIELD and GUIDE

—completely automatic

Blast holes, as seen in the picture, are kept clean from cuttings dropping back down the hole. A dam is formed about each blast hole excluding casual surface water.

•

SEND FOR COMPLETE DETAILS

•

PARIS MANUFACTURING CO.
PARIS, ILLINOIS

CORE DRILLING
—anywhere

"We look into the Earth"

PENNSYLVANIA Drilling CO.

DRILLING CONTRACTORS AND MFRS.
1205 Chartiers Ave. **Pittsburgh, Pa.** WAlnut 1-5816

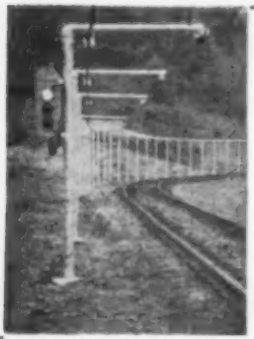
If you are MOVING...

Don't forget to notify us at least one month in advance to insure uninterrupted service to your subscription to COAL AGE.

Please send your change of address together with your old address to:

DIRECTOR of CIRCULATION
COAL AGE, 330 West 42nd Street
New York 36, N. Y.

DON'T FORGET TO NOTIFY YOUR POSTMASTER, TOO!



NUSSCO AUTOMATIC BLOCK SIGNALS FOR MINES

Save Trip Time on Main Haulage
Prevent Collisions

A two wire cable connects two or more signals together into one block. Only one signal can show proceed on the entrance of a trip, all other signals show stop.

- Low in Cost.
- Easy to Install.
- Write for Catalog.

NACHOD & UNITED STATES SIGNAL CO.
INCORPORATED
4771 Louisville Ave., Louisville, Ky.

"Cheatham Switch"

TRACK SWITCH THROWER ELECTRICALLY OPERATED

Thrown by Motorman • Saves Time and Money

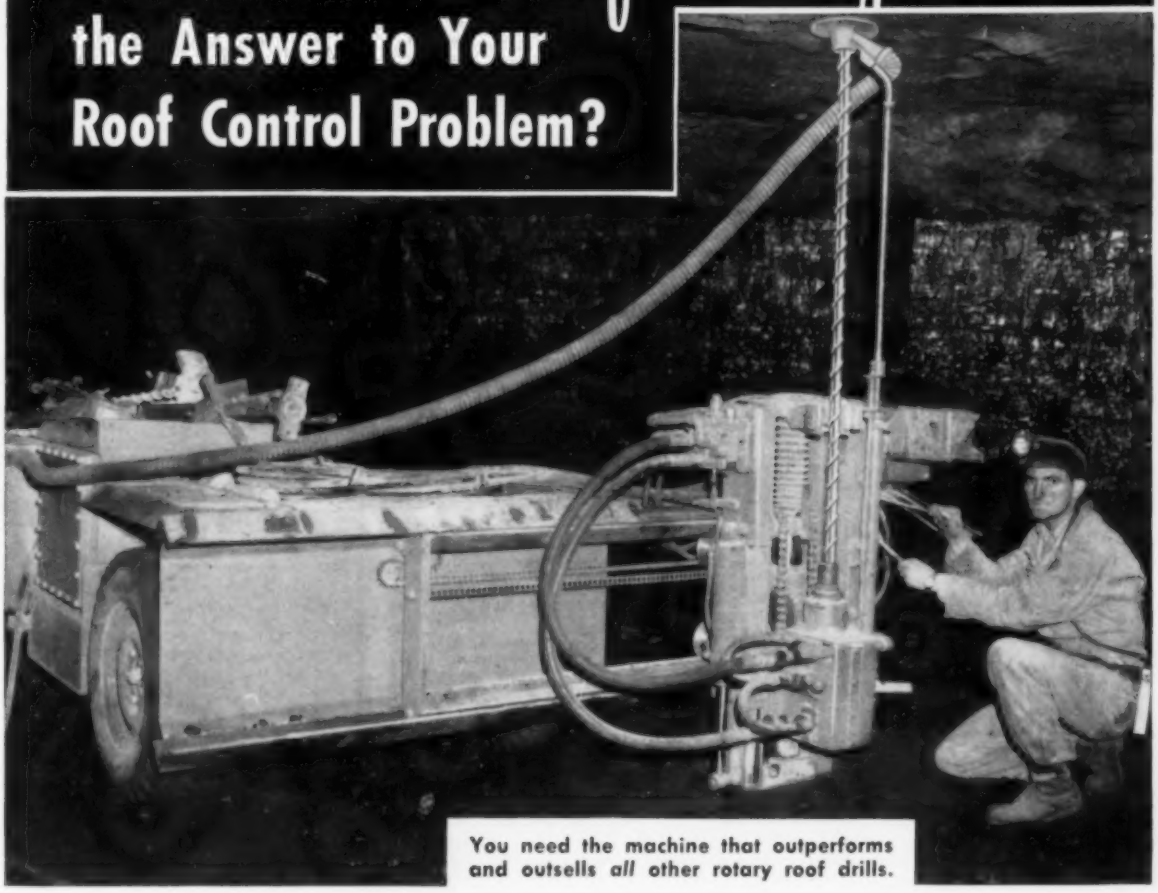
This modern track switch is thrown swiftly and safely by motormen as they sit in their cabs. It saves time and money, and is fool-proof and dependable!

Over 30 years experience manufacturing
ELECTRIC TRACK SWITCHES

Write for Catalog

CHEATHAM ELECTRIC SWITCHING DEVICE CO.
INCORPORATED
4780 Crittenden Drive, Louisville, Ky.

Is One-Man Roof Bolting the Answer to Your Roof Control Problem?



You need the machine that outperforms and outsells *all* other rotary roof drills.

Hundreds of high capacity FLETCHER Roof Control Drills are keeping well ahead of the machine cycle in mines throughout the country—*in many cases with a single operator!* With their convenient grouping of controls; long, fast strokes in varying seam heights; compact, easily trammed frame and all-hydraulic positioning, these FLETCHER machines will actually deliver two-man results with one-man operation.

In a midwest mine 120 bolts per shift is the average one-man installation rate! Over 230 bolts per shift have been installed with two men on a double section! *What is the bolting capacity of your present equipment?*

Shift-after-shift, FLETCHER Drills deliver more bolts at lower cost than any other drill on the market. That's why almost all mines, sooner or later, standardize on FLETCHER Roof Control Drills. Write for details.

Fletcher
ROOF CONTROL DRILLS

J. H. FLETCHER & COMPANY | P. O. Box 353, HUNTINGTON 8, WEST VIRGINIA
Phone 44186

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** :EQUIPMENT :USED OR RESALE

UNDISPLAYED ——RATES—— DISPLAYED

$1.20 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted undisplayed rate is one-half of above rates, payable in advance.

Box Numbers in care of our offices count as one additional line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Equipment Wanted or For Sale Advertisements acceptable only in Displayed Style.

The advertising rate is $10.20 per inch for Equipment and Business Opportunity advertising appearing on other than a contract basis. Contract rates quoted on request.

Employment OPPORTUNITIES—$12.80 per inch, subject to Agency Commission.

March issue closing February 16th.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

OUR USUAL BARGAINS

4—Late type 660-BH Goodman Loading Machines, 34" high, full hydraulic, each with one 10 HP drive and one 10 HP conveyor motor, 250 V, permissible type.
1—42" Belt Conveyor, 750' centers, Timken bearing carrying and return idlers, 7-ply Goodyear belt, 125 HP explosion-proof 440 V motor and contactor controls, speed reducer, and all necessary appurtenances.
2—JCM2E Joy Continuous Miners, 250 V, permissible type.
4—Late type Joy 11-BU Loading Machines, 250 V, permissible type.
4—5-SC Joy Shuttle Cars.
6—42E9 Joy Shuttle Cars.
5—Jeffrey 29-U Cutting Machines.

LOCOMOTIVES

4—20-ton Westinghouse Tandem Locomotives, each unit consists of two 10-ton Locomotives, Type 927-LD, 250 V motors. Hydraulic brakes, dynamic braking, sanders, contactor controls. In the 80,000 series.
4—20-ton General Electric Tandem Locomotives, each uit consist of two 10-ton Locomotives, Type GHM-848-A1, 250 V motors. Contactor controls, hydraulic brakes, dynamic braking, sanders. In the 29,000 series.

Above Tandem Locomotives were put in operation in 1950, and are completely rebuilt. Look like new shipped from the factory. Will change to any gauge.

2—20-ton Jeffrey MH-77, 250 V, complete with air brakes, sanders, and contactor controls. Practically new.
5—15-ton Jeffrey MH-77.
6—15-ton Jeffrey MH-110.
4—10-ton Jeffrey MH-143.
10—8-ton Jeffrey MH-100.
3—300 KW General Electric Rotary Converters, Type HCC-6, Form P, 1200 RPM, 250/275 V, complete with switchboards, switchgear, and I-T-E automatic reclosing circuit breakers.
1—Practically new 300 KW Westinghouse Rotary Converter, 1200 RPM, 250/275 V, complete with switchboards, switchgear and automatic reclosing circuit breaker.

Above Rotary Converters all equipped with three single phase, 60 cycle transformers, 2300/4000 V, AC.

3—200 KW General Electric Synchronous Rotary Converters, Type HCC-6, Form P, 1200 RPM, 250/275 V, complete with switchboards and all necessary switchgear including three single phase, 60 cycle transformers, 2300/4000 V.

All types Loading and Cutting Machines; Shuttle Cars; several lots of practically new Rotary Dump and Drop Bottom, all steel Mine Cars; and Single and Double Drum Slope, Shaft and Drift Hoists, complete with all necessary appurtenances.

WE SPECIALIZE IN BUYING OUTRIGHT COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

COAL MINE EQUIPMENT SALES COMPANY

Frank J. Wolfe — Phone L. D. 34 — Sheldon J. Wolfe
Terre Haute, Indiana

---

2 Barrett Haentjens Acid Resisting Pumps,
1 Stainless Steel, 1 Bronze
300 GPM 575 Ft. Head Direct Connected on a common cast iron base to 75 HP 3 phase, 60 cycle, 440 Volt, 1800 RPM KT motors.
Price $1000 Each
Eljay, Inc., 401 Broadway, New York 13, N.Y.

Locomotives, 5 to 100 tons, diesel, elec., gas.
B-Monighan Walking draglines, 9W, 7W, 5W, 4W.
Rotary car dumper, 100-ton, used 6 mos.
Marion 7400, 7200 Walking draglines.
Bucyrus 7-yd. 150-B, and 5-yd. 120-B shovels.
Rotary kilns, dryers, 7x110, 6x74, 5'x40'.
Diesel-electric generators, 500 to 3500 KW.
Euclid diesel end & bottom dump trucks, 15-22T.
H. Y. SMITH CO.
828 N. Broadway — Milwaukee 2, Wis.

BIG DRAGLINE BARGAIN

621-S Two Engine Page Walker
135' Boom — 6 Yard Bucket
Completely overhauled
Pennsylvania location. Right Price
Write — wire or phone

FRANK SWABB EQUIPMENT CO., INC.

313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

POSITION WANTED

Position Wanted—Coal mine general superintendent or superintendent. 20 years experience in all types and phases of coal mining. Thoroughly experienced in mobile, track and belt mining. References on request. Write in care of PW-9078, Coal Age.

BUSINESS OPPORTUNITY

Coal Mine for sale, located on C. M. & Pacific railroad, centre of uranium field, future possibilities unlimited. Write Williams Coal Co., Roundup, Montana.

WANTED

National mining organization offers excellent opportunity for mining engineer with coal experience. Position involves writing and working with members of the mining industry.
Include information as to age, education, experience, marital status, salary requirements, and a recent photograph.

P8636 Coal Age
330 W. 42 St., New York 36, N.Y.

WANTED

2—11 BU Loaders.
2—10 RU Cutters.
2—10 SC Shuttle Cars.
1—Joy Continuous Miner—Mine 7 ft. coal.
3—7 AU or 10 AU Cutters.
Roof Bolting Equipment.
Rotary Drills or Stopers with Compressors, 250 or 550 Volt DC.

Must be in good operating condition.

Submit offers with full details to:

SIMPSON COAL & CHEMICAL CORPORATION
120 Wall Street, New York 5, N. Y.
Tel: WHitehall 3-1600

WANTED

Belt Conveyors: 24" x 3000' and 36" x 2000' complete or component parts. Also other good used equipment for large plant.

A. T. McLeod
Marietta — Kansas

RELAYING RAIL

All Sizes
Track Accessories

LEFTON INDUSTRIAL CORP.

General Office: 212 Victor Street
St. Louis 4, Missouri

NEW and REBUILT STORAGE BATTERY

LOCOMOTIVES

1½ to 10 Tons 18" to 56½" Track Gauge.
GREENSBURG MACHINE CO.
Greensburg, Pa.

---

2 TELEPHONES $22.75



Inter-communication handsets, two wire system. Included Two 3 volt batteries, 50 ft. of wire and simple wiring instructions. Additional wire 1 cent per ft. or $25.00 per mile. Complete list of telephone parts, handsets, magneto—common battery — and dial telephones, switchboards, etc. "50% deposit required on all C.O.D. orders."

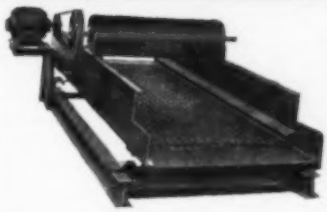
Telephone Engineering Co., Dept. 2CA8, Simpson, Pa.

Make Your Mining Operation More Profitable!

Through the years the name BONDED has become identified as the best at an economical price wherever there is a need for crushing, feeding, screening and conveying machinery for all types of surface and underground mining operations.

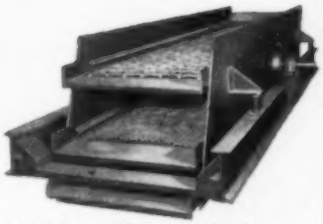
Use Dependable BONDED Equipment

All BONDED equipment is manufactured in a wide variety of sizes to fit almost every need, and special sizes can easily be built to your specifications and particular requirements.



• BONDED® General and Heavy Duty Vibrating Screens

General Duty Models		
Size	Decks	Price
2' x 4'	1	$355.00
3' x 6'	1	495.00
3' x 8'	1	575.00
Heavy Duty Models		
3' x 8'	2	1165.00
3' x 8'	3	1250.00
4' x 8'	2	1695.00
4' x 10'	3	2095.00
4' x 12'	3	2395.00



These vibrating screens improve sizing, grading and cleaning or separates solids from liquids. Fast, efficient treatment of all minerals, chemicals and other industrial products. Screening areas range from 2' x 4' to 5' x 14' with 1 to 5 decks giving 2 to 6 accurate separations. Bonded screens perform with maximum efficiency whether for heavy scalping of high tonnages, large capacities for multiple sizing, dedusting or dewatering. Economical operation and low maintenance. Write for bulletins #1086 and #1087. Prices from **$355.00.**

Bonded Carries Large Stocks of Screen Cloth for Immediate Shipment

• BONDED® Troughing Idler Conveyors



Ideal for either surface or underground operation, and can be supplied in any length with any belt width desired. Bonded furnishes complete conveyors or prefabricated sections . . . full range of idlers, belting, accessories, to make your own conveyors. Conveyors are equipped with 5" roll diameter idlers and return rolls, 20" diameter head pulley and 16" diameter tail pulley mounted on 2 1/4" or 2-7/16" diameter shaft. Belt is new 4-ply, 28 oz. duck, 1/8" top rubber x 1/32" bottom rubber cover. Ready-Fab sections are easily assembled on the job.

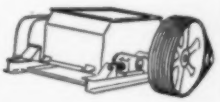
Belt Width	Conveyor Length	Price	Conveyor Length	Price
14"	25'	$ 672.	50'	$1064.
16"	20'	592.	45'	1042.
18"	30'	825.	55'	1257.
18"	85'	1798.	100'	2065.
20"	35'	960.	60'	1429.
24"	40'	1139.	70'	1744.
24"	100'	2339.	130'	2985.
30"	45'	1375.	90'	2432.

For conveyors longer or shorter than those listed at left, add or deduct the following per foot prices according to belt width. All prices include belting.

For 14" belt .... $15.66 per ft.
For 16" belt .... 16.78 per ft.
For 18" belt .... 17.20 per ft.
For 20" belt .... 18.95 per ft.
For 24" belt .... 20.26 per ft.
For 30" belt .... 23.02 per ft.

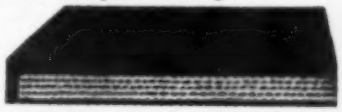
Equally low prices on other lengths and belt widths. Complete details in Bulletin #939, write for it.

• BONDED® Roll Crushers



Both single and double roll crushers available for accurate, high capacity sizing of coal, lightweight aggregate, phosphate rock, chemicals, limestone chips, fertilizers and many other natural and manufactured materials. All Bonded crushers are available with tooth, smooth, fine or coarse corrugated or combination of smooth and corrugated rolls. These crushers operate at minimum cost, cut manpower requirements, eliminate delays, reduce production costs. Capacities to 500 tons per hour. Write for Bulletin #1119 for complete details. Prices from **$479.00.**

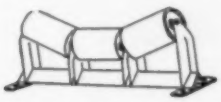
• BONDED Rubber Conveyor Belting



A fine grade of belting for troughing or picking idler conveyors used in mines and quarries. For moving coal, crushed stone, sand and gravel, earth, chemicals, clay products and other bulk materials both wet and dry. Heavy duty 4-ply, 28 oz. duck, 1/8" top rubber cover x 1/32" bottom rubber cover belting having high tensile strength, tough cotton duck, strong carcass and proper flexibility. Also available with varying thicknesses of top and bottom covers, in from 4 to 8 plies, and widths to 60". Bonded's low belting prices save you up to 25%. Write for free sample.

Width	List Price	Sale Price
14"	$3.43 ft.	$2.75 ft.
16"	3.86 ft.	2.88 ft.
18"	4.27 ft.	3.19 ft.
20"	4.69 ft.	3.69 ft.
24"	5.55 ft.	4.14 ft
30"	6.77 ft.	5.06 ft.
36"	8.01 ft.	6.00 ft.

• BONDED® Ball Bearing Troughing Idlers and Return Rolls



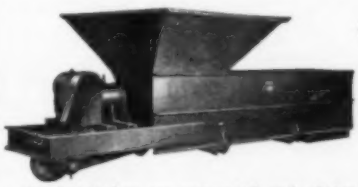
Standard dimensions make these modern idlers replacements in your present conveyors. Rolls are steel tubing, 5" diameter with quality ball bearings. Shafts are 3/4" in diameter and run completely through each roll. Sealed bearings are supplied, packed with high quality lubricant. Bonded idlers can also be equipped with bearings of equally high quality, but which are lubricated through alemite fittings. Maintenance is negligible for either type.

3-roll, 5" diameter Troughing Idlers for:

14" belt—$17.25 24" belt—$19.75
16" belt— 18.00 30" belt— 20.50
18" belt— 19.00 36" belt— 21.25
20" belt— 19.25 48" belt— 23.75

1-roll, 5" diameter Return Idlers for:

14" belt—$ 6.75 24" belt—$ 8.00
16" belt— 7.00 30" belt— 8.75
18" belt— 7.50 36" belt— 9.25
20" belt— 7.75 48" belt— 10.75



• BONDED® Reciprocating Plate Feeders

Bonded feeders are economical and efficient for controlling feed to crushers, screens, conveyors, mills and other processing machinery. Excellent for handling high tonnage of coal, metallic ores, crushed stone, aggregate, sand and gravel and almost any other bulk material. Sizes for every need. Priced from **$280.00.**

IMMEDIATE SHIPMENT FROM OUR FACTORY — WRITE, WIRE OR PHONE

BONDED SCALE and Machine Co.

Phone Hickory 4-2186 Days— WRITE FOR FREE CATALOG AND PRICES Phone AX 1-2213 Evenings

95 Kingston, *Mfgrs. of Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers, Feeders and Scales.* Columbus 7, Ohio

OUR advertising is not the *BEST* but our *MACHINERY* is

WE ORIGINATE — OTHERS IMITATE

Remember we have the largest stock of mining equipment in America and at real bargain prices.

We Own What We Advertise

All types of Joy Cutters, Loaders, Shuttle Cars, Cat Trucks, Belt Conveyors, Chain Conveyors, etc., Includes:

JOY EQUIPMENT — rebuilt

1—Joy 20BU, 24" high, Loader, like new.
1—Joy 14BU, low pedestal Loader, 38-J head motors.
1—Joy 14BU, 7CE Loader, 10 H.P. motors.
1—Joy 14BU, 3PE Loader.
3—Joy 12BU Loaders, 9E, like new.
1—Joy 8BU Loader.
6—Joy 32E9 Shuttle Cars.
2—Joy 32D Battery Cars.
2—Joy 50C Shuttle Cars, 250 volt DC.
2—Jeffrey 66-B four wheel drive, latest type, shuttle cars.
1—Joy T-1 Standard Cat Truck.
3—Joy T-2-5 Cat Truck, AC & DC.
2—Joy Ladel MTB 30", 25 and 40 H.P. tandem drive, 2000' Belt Conveyors.
2—Joy PL11-14 Elevators on rubber.
4—Joy 11B Cutting Machines, like new.
1—Joy 7B1 Cutting Machine. Excellent.
8—Goodman Machines on cars, 31" high. All hydraulic.
3—Goodman 512 Cutting Machines.

LOCOMOTIVES

1—Jeffrey MH-121 Locomotive, 26" high.
2—Jeffrey 12 ton MH-143 Locomotives, perfect.
3—Jeffrey 20 ton, type MH-110.
1—Jeffrey 13 ton, type MH-110.
3—Jeffrey 10 ton, MH-78, 42" & 48" Gauge.
4—Jeffrey 8 ton, type MH-100, 42", 44", and 48" Gauge.
12 Jeffrey 8 ton, type MH-88, 42", 44" and 48" Gauge.
7—Jeffrey 4 ton, type MH-96, 42", 44" and 48" Gauge.
3—G.E. 4 ton, type 825 Locomotives, 20" high.
10 G.E. 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Gauge.
1—G.E. 6 ton, type 822 Locomotive, 44" Gauge.
3—G.E. 10 ton, type 809 Locomotives, 42", 44" and 48" Gauge.
8—Goodman type 33, 6 ton, 44" and 48" Gauge.
2—Goodman 8 ton, type 32A, 44" and 48" Gauge.
2—Goodman 13 ton, type 29A, 44" and 48" Gauge.
3—Westinghouse type 902, 4 ton.
2—Westinghouse type 904, 6 ton.
6—Westinghouse type 907, 10 ton.
3—Gasoline and Diesel Locomotives, 4 to 10 tons.

TIPPLE EQUIPMENT

1—Jeffrey 24" x 24" Crusher.
2—Jeffrey 30" x 36" Crushers, new.
2—Double Roll Crushers.
2—Cedar Rapids portable super Screening Plants.
1—Portable Belt Conveyor 30", gas driven.
1—Railroad Car Unloading Conveyor, gas driven.
1—Allis Chalmers 5' x 14' Ripple Vibrator.
1—4' x 10' Robbins Gyrex Vibrator.
Feeders, Drag Conveyors and Loading Booms.

CUTTING MACHINES

4—Baby Goodman 212's, rebuilt.
3—Goodman 312's, 18" high.
5—Goodman 412's Cutters, 18" high.
2—Goodman 512's, hydraulic.
15 Goodman 12AA's and 112AA's.
10 Goodman 324 Slabbers.
2—Goodman 224 Slabbers.
2—Goodman 724 Slabbers.
1—Jeffrey 29C on cats.
6—Jeffrey 35L's, like new.
6—Jeffrey 35B's and 35BB's.
2—Jeffrey 29B's on track.
1—Jeffrey 29L, track mounted.
2—Jeffrey 29C's, track mounted.

LOADING MACHINES

7—Joy Loaders, all types.
2—Jeffrey 61 CLR on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Goodman 360 Loaders.
4—Myers Whaley No. 3 Automat Loaders.
4—Clarkson Loaders, 26" above rail.

CONVEYORS

10 Jeffrey 61HG Face Conveyors.
6—Jeffrey 61AM Room Conveyors, 300 ft.
3—Long type 400 Room Conveyors, 300 ft.
2—61EW Elevating Conveyors.
2—61WH 15" Room Conveyors, 300 ft.
4—Joy 30" Belt Conveyors, 10 to 40 H.P.
1—Joy Ladel UN-17 Shakers.
10 Goodman G-12½ and G-15 Shakers.

CONVERTERS AND DIESEL PLANTS

3—100 KW, G. E. TCC-6's, 250 volt Rotary Converters.
3—150 KW, G.E. HCC-6's, 250 volt Rotary Converters.
2—200 KW, G.E. HCC-6 Rotary Converters.
1—300 KW Westinghouse Rotary Converter.
1—500 KW Westinghouse Rotary Converter.
(all the above with 6900/13000 and-or 2300/4000 primary transformers)
1—200 KW Westinghouse portable Rectifier.
3—150 KW MG sets, G. E. and Westinghouse.
1—200 KW MG Set, General Electric.
2—300 KW MG Set, General Electric.
1—500 KW MG Set, General Electric.
1—Cummins 125 KW, 250 volt DC.
1—700 H. P. Shaft Hoist complete.
Complete steam plant, will sell all or any part.
Boilers, like new, 1100 H. P., 500 H. P. Transformers. Turbines, etc.
Complete Tipples with Cleaning Plants.

ROCK DUSTERS

1—MSA hi pressure on rubber.
1—MSA hi pressure on skids.
1—MSA low pressure Room Duster.
1—Canton Distributor low pressure.

MISCELLANEOUS

10 Air Compressors 1 H. P. to 40 H. P.
1—Portable Self Propelled Compression on rubber tires, 30" high.
40 Mine Pumps, all types.
Pipe, plastic, steel transite, all sizes 1" to 6".
400 Mine Cars, drop bottom and end dump, all gauges.
150 Mine Cars, 18" high, end dump, 44" gauge.
5—Brown Fayro HKL and HGD Car Spotters.
1—12 ton Differential Slate Larry.
4—Overhead Bridge Cranes.
1—Kanawha Hillside Dump.
1—16 Yd. Dragline Bucket.
5—Low Vein Water Cars.
3—3000 Gal. Tanks, like new.
3—9,000 Gal. Tanks.
Incline Hoists, 25 to 50 H. P.
Machine Tools for mine shops.
1000 tons rails, all sizes.
4,000 Ft. 3/C, 5000 volt 2/0 cable.
30 tons copper trolley and feeder.
6 Electric Drills, CP 572.
300 Transformers from 1 to 2000 KVA and 110 to 13000 primary volts.
400 Electric Motors, 3 to 200 H.P.
Suspension Bridge 300 ft. long for river crossings.
1—International TD-18 Angledozer.
1—Allis Chalmers HD-7 Angledozer.
Huge stock of Mine Supplies.

Thousands of other Items — Send us your Inquiries — It Doesn't Cost — It Pays to Buy From

Logan, W. Va. **J. T. FISH & COMPANY** Phone 2825

BOX CAR LOADERS

3—Ottumwa 20 HP box car loaders
2—Manierre 22 HP box car loaders
1—Jeffrey 20 HP box car loader
2—Red Devil portable loaders, 12" x 15"
1—Card portable loader, 11' x 19'

ROTARY DUMPER

1—Card Rotary car dumper, 13'x15' platform

ELECTRIC HOISTS

1—11 HP Vulcan, single drum
1—20 HP Vulcan, single drum
1—22 HP Vulcan, double drum
1—25 HP Vulcan, single drum
1—30 HP Vulcan, single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
4—100 HP Box single drum
1—112 HP Vulcan, single drum
1—150 HP Vulcan, single drum
3—125-200 HP Ottumwa single drum
1—250 HP Ottumwa single drum
1—375 HP Box single drum

RAIL

We have in stock good relaying rail 16# to 100#, also new rail and fittings, 12#, 16# and 20#

LOADERS & CONVEYORS

1—11BU Joy loader, 250V, D.C.
3—5 BU Joy loaders, 250V, D.C.
1—61EW Jeffrey elevating chain conveyor
1—61HG Jeffrey chain conveyor, 90'
1—61W Jeffrey chain conveyor, 200'
9—G-20 Goodman shakers
6—G-15 Goodman shakers
8—Vulcan shakers
2—UN-17 Joy LaDel shakers
10—Goodman HA duckbills

MINING MACHINES

A.C.

1—7B Sullivan super shortwall
10—Sullivan CE7
1—28A Jeffrey
5—112A Goodman

D.C.

5—7B Sullivan super shortwall
2—Y-1 Joy crawler type trucks

SCALES

3—100 ton Fairbanks railroad scales
1—125 ton Howe railroad scales

COAL CARS

88—60 cu. ft. Card steel, end dump, 36" ga.
88—60 cu. ft. Card steel, end dump, 36" ga.
91—107 cu. ft. Watt steel, end dump, 42" ga.

SHUTTLE CARS

1—Joy model 42D5, battery operated
3—Joy model 60D3P, battery operated
7—Joy model 60D1, battery operated

MINE FANS

1—120" Joy LaDel axial flow fan, model L-14
1—8H Jeffrey 42" aerodyne fan
1—7" Jeffrey aerodyne 2 stage fan
1—3600 cfm Claridge blower, 3 HP

BATTERY LOCOMOTIVES

1—4 ton Westinghouse, 24" ga.
1—4 ton Ironton, 36" ga.
2—5 ton General Electric, 36" ga.
2—7 ton General Electric, 36" ga.
3—8 ton Ironton, 36" ga.
2—8 ton General Electric, 36" ga.
2—8 ton Goodman, 36" ga.
4—10 ton Atlas, 36" ga.

TROLLEY LOCOMOTIVES

1—2½ T. Jeffrey, 36" ga.
1—4½ T. Goodman, 36" ga.
1—5 T. Jeffrey, 36" ga.
1—6 T. Goodman, 36" ga.
1—6 T. Goodman, 42" ga.
2—8 T. Goodman, 42" ga.
3—10 T. Jeffrey, 42" ga.
1—13 T. Goodman, 42" ga.
1—13 T. Jeffrey, 42" ga.
3—15 T. Jeffrey, 42" ga.

BATTERY CHARGERS

1—8.2 KW G. E. 150/182 V., 15 HP motor, 440V, AC
1—8.5 KW Hertner, 103/120 V., 15 HP motor 440V,AC
1—10 KW Hertner, 150/181V., 15 HP motor, 440V, AC
1—11.5 KW West., 125 V., 17.5 HP, 440 V AC motor
1—15 KW Elec. Prod. 132 V., 30 HP motor, 440 V AC
1—50 KW Hertner, 155 V., 75 HP motor, 440 V. AC
4—250V D.C. battery charging switchboards
1—Joy battery charger, model U-248-20GE 126.5 volts 25 HP motor, 440 volts AC
1—Joy battery charger, model U-248-20GE 126.5 volts 30 HP motor, 250 volts DC
3—Joy battery chargers, model U-246-BE3 123.5 volts, 15 HP motors, 250 volts DC
3—Weston type P-48, 132 V., 30 HP motors, 250 V. DC

ROCK DUSTERS

1—M.S.A. type A, 2 HP 250V. DC motor
1—M.S.A. type A, 440 V. AC motor
1—M.S.A. 25-1103, 20 HP 230 V. DC motor

We have been authorized by the United States Bureau of Mines to repair and rebuild permissible equipment and to replace and affix permissible plates within existing requirements.

Since 1898 Dependable Reconditioned Machinery

MORSE BROS. MACHINERY CO.

2900 BRIGHTON BLVD. EST. 1898 DENVER 1, COLO.

2400 Hi Lift — 4500 Manitowoc

Lima 2400 — 67' boom — 50' stick 4 yd. dipper—Caterpillar diesel 9000 hours total service.

4500 Manitowoc — 120' boom — 5 yd. bucket — Caterpillar diesel.

Reich 600 Rotary Air Drill on Truck.

FRANK SWABB EQUIPMENT CO., INC.

313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 3-3658

LIDGERWOOD HOIST

Serial #8001. 250 H.P. 2300 volt slip ring motor drive Hoist designed for 350 f.p.m. of 1⅞" rope.

Face of drum 55 9/16", diameter to bottom of groves, 84". Electric brake connected. Split drum, all steel base, Blue prints available.

2000 KVA G.E. type H. T. Form D.H. 66,000/22000/2300/60 cycle
Serial #4540898

ELJAY INC.

L. J. Land, Pres.
401 Broadway, New York 13, N. Y.
Telephone Worth 6-0969

MOTORS · GENERATORS
TRANSFORMERS
NEW · REBUILT
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT CO.
PHONE STATION COLLECT GL 6781
P.O. BOX 51 ROCHESTER 3, NEW YORK

MODERN COAL PREPARATION PLANT

OFFERED AT A— *Sacrifice*

EXCELLENT CONDITION

A modern—5 track—400 tons per hour—coal preparation plant—located at Herrin, Illinois. This plant was built seven years ago and was designed to be dismantled economically. Roberts and Schaefer Company planned and constructed the plant with the idea that it was to be sold when the coal supply was exhausted. Now that the supply has been exhausted, Freeman Coal Mining Corporation offers this unusual opportunity to purchase the entire plant at a fraction of its original cost. The plant is in excellent condition and has been closed for a short time. The entire plant has been completely vacuumed and all equipment preservation measures have been taken. This is a combination wet and dry coal cleaning plant—anything under 1½" is air-cleaned—anything over 1½" is water-washed We urge you to write or call at once for additional information.

ONCE IN A LIFETIME OFFER !



Call or Write | ANdover 3-2800

FREEMAN COAL MINING CORPORATION
300 W. WASHINGTON ST. CHICAGO 6, ILL.

CAT TRUCKS

1—Goodman Cat truck, 220 volts, AC.
3—Joy TI-3PE Cat trucks, 250 volts, DC.

HOISTS

1—400 HP Stearns-Roger Single Drum Hoist. Capacity for 5500 Ft. 1⅛" Rope.
1—150 HP Ottumwa Conical Drum Hoist.
1—100 HP Ottumwa Iron Works Double Drum Hoist.
1—80 HP Clyde Iron Works Single Drum Hoist.

CONVEYORS

1—500' Long JBL Flight Conveyor with 400-B Head and 15HP DC Motor.

COPPER

Approximately 15,000' 3/conductor, 2/0 5000 volt trenchlay cable as good as new, wrapped on reels 300'-500' long.
Several 1000 ft. reels of 3/conductor, 2/0 armored lead covered 2200 volt cable.

CRUSHERS

1—30 x 40 McNally Pitts. Double Roll.
1—30 x 40 McNally Pitts. Single Roll.
2—20 x 24 Jeffrey Flextooth crusher. Can be used for any size coal.
2—36 x 36 Jeffrey single roll crushers.
2—18 x 18 McNally Pittsburg double roll stoker crushers.
1—20 x 24 McNally Pittsburg single roll crusher.
1—24 x 48 McNally Pittsburg double roll crusher, newest type, only used approximately 30 days, good as new with steel base and V belt drive.
1—Type AC-3A American Pulverizer crusher.

DIESEL ENGINES

1—Brand New 60 HP International Type UD14A. Priced attractively.

FANS

1—5' Jeffrey Aerodyne Fan.
1—4' Jeffrey booster fan, ball bearing, new type, without motor. We can furnish any size motor to run the fan any speed you wish.
1—7' Joy Fan, type H-111-36, like brand new.

LOADING MACHINES

1—8 BU Joy, 220 volts, AC., Permissible.
10—11 BU Joy Loaders, type 10 APE, 250 volts, DC., Permissible.
4—8 BU Joy Loaders, 250 volts, DC.
1—14 BU, 250 volts, DC., Joy Loader, Permissible.

LOCOMOTIVES

1—15 ton MH77 Jeffrey ball bearing armature locomotives, complete with hydraulic brakes. New in 1947, used 2 years, as good as new. Complete specifications as follows:
42" gauge, overall dimensions, length 16', 8" width 5' 4½", wheelbase 6' 4", height 42". Heavy duty equipment making locomotive weigh approx. 17 tons.

3—15 ton MH77 Jeffrey ball bearing armature locomotives, 42" gauge, not with hydraulic brakes, late type, as good as new. Dimensions: length 16' 8", width 5' 4½", wheelbase 6' 4", height 42". Heavy duty equipment making locomotive weigh approx. 17 tons.

1—16 ton MH143 Jeffrey locomotive, complete with ball bearing journals and armatures, #7575, 42" gauge. Overall height 34", length 14' 2", with 61". This locomotive was used very little. Just like new, and we have an extra set of new armature field coils and new parts worth several hundred dollars.

2—10 ton General Electric, ball bearing, 48" gauge.
2—6 ton Jeffrey ball bearing journals, and motors. 42" gauge, type MH 78.
25—6 ton MH 88 Jeffrey, ball bearing, 42" gauge.
1—8 ton Goodman, type 91K42-54T, 42" gauge, 27" high, new in 1950, used only 6 months.
12—6 ton Mancha Battery Locomotives, 42" gauge, 42" high overall. Sold with or without batteries.
All Electric locomotives 250 volts DC.

MAGNETIC PULLEYS

1—Stearns 36" magnetic pulley.

MINING MACHINES

2—512 EJH Goodman, 250 volts, DC, permissible, 8½' cutter bars with hydraulic jacks and bug dusters, complete with Joy T1 cat trucks.
1—29UR Jeffrey Mining Machine, 250 volts, DC, 9' cutter bar, #26531.
6—7B-1 Sullivan, 250 volts, DC, 8½' cutter bars, complete with bug dusters, permissible with Joy T1 Cat trucks.

MOTOR GENERATOR SETS

1—200 KW Ridgeway, 2200 volts AC, 230 volts DC, 900 RPM.
1—300 KW Allis Chalmers, 2200 volts AC, 275 volts DC, 1200 RPM.
3—300 KW Burke, 2300 volt AC generators. Direct connected to 390 HP Imperial Diesel engines.
1—300 KW Ridgeway Motor Generator set, 2300 volts AC end, 275 volts DC end, complete with switchboard as good as new.
2—200 KW General Electric motor generator set, 1200 RPM, 2300 volts AC end, 250/275 volts DC end, complete with automatic circuit breaker, late type.
1—200 KW Westinghouse motor generator set, 900 RPM, 2200 volts AC end, and 250 volts DC end.
2—150 KW General Electric motor generator sets, 2300 volts AC end, 250/275 volts DC end.
5—150 KW Westinghouse motor generator sets, 1200 RPM, 2200 volts AC end, 250/275 volts DC end. Above sets all complete with either fully automatic switchboards or manual starters and automatic circuit breakers.

ROCK DUSTERS

3—MSA Type S rock dusters, 30 HP, DC motors, 220 volts, 42" gauge tracks.
1—MSA Bantam rock duster, 220 volts DC, Permissible.

ROTARY CONVERTERS

2—300 KW Allis Chalmers Rotary Converters, volts 135, amps 606, 6 phase, 60 cycle, 1200 RPM DC, volts 250, amps 1200, complete with manual starting equipment and transformers, as good as new, tested by a large electrical shop.
1—200 KW General Electric synchronous Rotary Converter #4098227, type HCC-6-200-1200, 1200 RPM, 60 cycle, 275 volts, 727 amps. Steel base complete with transformers, in perfect condition. As good as new.

SCALES

1—30 ton Winslow 34' long with spinks indicator.

VIBRATORS

2—4' x 10' Selectro single deck vibrators, can be made two deck.
1—4' x 12' Deister single deck vibrator.
1—4' x 10' Stephens-Adamson two deck vibrator.
4—5' x 14' Tyler T-600 double deck vibrators.
1—5' x 12' Tyler T-600 double deck vibrators.
3—4' x 8' Tyler T-400 single deck vibrators.
2—5' x 12' Tyler T-600 Single Deck.

GAVENDA BROTHERS, INC., Canton, Ill.

PHONES 739 and 2438

SHOVELS — DRAGLINES DRILLS TRACTORS — TRUCKS

170-B Bucyrus-Erie Electric 6½ yd. shovel
1600 P&H 6 yd. electric shovel
2400 Lima 6 yd. diesel shovel
2400 Lima 4 yd. Hi-Lift shovel
120-B Bucyrus-Erie electric 5 yd. shovel
1400 P&H 4 yd. electric shovel
111-M Marion 3½ yd. diesel shovel
4161 Marion 5 yd. electric shovel. Worked about three years.
1201 Lima 3½ yd. Diesel Shovel
955 P&H 2½ yd. Diesel Shovel
1201 Lima Hi-Lift Diesel Shovel 42' boom, 32' stick, 2½ yd. dipper.
1201 Lima Semi-Hi-Lift Diesel Shovel, 36' boom, 27' stick, 2 yd. dipper
3500 Manitowoc Hi-Lift diesel shovel, 45' boom, 35' stick, 2 yd. dipper
111-M Marion Hi-Lift diesel shovel, 43' boom, 23' stick, 3 yd. dipper
40-A Marion Hi-Lift diesel shovel, 45' boom, 34' stick, 2½ yd. dipper
9W B-E Electric Dragline 200' boom, 8 yd.
7400 Marion Electric Dragline 200' boom, 8 yd.
625 Page diesel dragline 150' boom, 9 yd. bucket
5-W Bucyrus-Erie diesel dragline 125' boom, 5 yd. bucket
2400 Lima diesel dragline 130' boom, 5 yd. bucket
4500 Manitowoc diesel dragline 120' boom, 5 yd. bucket
B-E 120B Electric dragline 110' boom 4 yd. bucket
4161 Marion dragline 110' boom, 5 yd. bucket
111-M Marion diesel dragline 80' boom, 4 yd. bucket
1055 P&H diesel dragline 80' boom, 4 yd. bucket
1201 Lima diesel dragline 85' boom, 3 yd. bucket. Independent boom hoist.
3500 Manitowoc diesel dragline 85' boom 2½ yd. bucket
600 Reich Heavy truck mounted rotary drill
Quarrymaster Drill with 2—500 cu. ft. compressors
58-BH Joy Champion Rotary Air Drill
56-BH Joy Middleweight Rotary Air Drill
Also 42-T, 29-T, and 27-T Well Drills

Euclid Trucks—Many to Choose From

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

IRONTON
Electric Locomotives
New and Used
The Ironton Engine Company
Farmingdale, New Jersey
(formerly IRONTON, OHIO)

FOR SALE:
Bucyrus-Erie AXY Bucket
7 yards just rebuilt, complete with Spreader Bar, 2 inch manganese drag chains, bail chains, trip sheave block, 2 sets extra teeth; Price $3250.00 loaded.
Harris-Walsh, Inc., Scranton, Pa.

-TRANSFORMERS-
BOUGHT AND SOLD

We carry a large stock of rebuilt and guaranteed transformers, and invite your inquiries.

Custom-built transformers and coils manufactured to your specifications.

Expert Repair Service—all makes and sizes of transformers rewound, repaired and redesigned. Ask for our price schedule.

THE ELECTRIC SERVICE CO., INC.
5322 Hetzel St. Cincinnati 27, Ohio
40 Years' Dependable Service

FOR SALE— USED EQUIPMENT
Subject to Prior Sale or Commitment!!

1—375-B Bucyrus-Erie Dragline, Serial No. 10714, equipped with 155-ft. boom, 10-yard bucket
1—360-M Marion Dragline, Serial No. 5700, equipped with 150-foot boom, 10-yard bucket
1—Set Dragline Equipment for Marion Model 4101, as follows: 90-ft. boom; Fairlead; Drag Drum, complete with gears, pinion, clutch band, brake band and lagging for hoist drum (bucket not included)

For Further Information, Contact:
Purchasing Agent
TRUAX-TRAER COAL COMPANY
111 North Wabash Avenue
Chicago 2, Illinois

OFFERING FOR IMMEDIATE SALE

All of the underground mining equipment formerly owned by Twin Seam Mining Company, Tuscaloosa, Alabama, High Point Coal Company, Carryville, Tennessee, and No. 8 mine of Anchor Coal Company, Highcoal, West Virginia, along with all our other inventory at Whitesburg, Kentucky, and Clarksburg, West Virginia.

TRACKLESS EQUIPMENT

(W) 2—6SC Shuttle Cars—Rebuilt
(C) 1—11BU Joy Loader
(C) 2—12BU 9E as is or Rebuilt
(C) 2—8BU as is or rebuilt, 500 volt
(C) 2—8BU as is or rebuilt, 250 volt
(C) 2—8BU 11G, 220/440 volt AC
(C) 2—5SC Joy Shuttle Cars
(C) 2—32E7 Joy Shuttle Cars
(W) 8—32D Joy Battery Cars—Complete
(C) 2—Lee Norse Shuttle Cars
(W) 2—T2-5FG, 220/440 volt AC Cat Trucks
(C) 1—Goodman 865 cat mounted loader
(C) 1—Goodman 360 rubber mounted loader
(C) 1—14BU3PE Joy Loader
(C) 1—Kersey model 444 mine tractor—batteries
(C) 1—1224 Goodman cutter, rubber mounted
(C) 1—T1 Joy Cat Truck
(C) 2—Late type Goodman Shuttle Cars, 42" high

CONVEYORS

(W) 2—95A Goodman belt conveyors, 24" wide approximately 1,000' centers, complete less belt
(W) 1—97HCD 30" Goodman belt drive
(W) 3—61AM Jeffrey room conveyors
(W) 2—61HG Jeffrey face conveyors
(W) 4—G15 Goodman shaker conveyors
(W) 4—G12½ Goodman shaker drives
(W) 200—Column type pans for G15 shaker
(W) 2—15" Joy chain conveyors
(C) 5—15" Long chain conveyors with 15, 25, & 30 a.p. drives
(W) 1—40 h.p. Robbins 30" belt conveyor 1700'
(W) 1—PT12 Long Piggyback

CUTTING MACHINES

(C) 1—1224 Goodman, rubber mounted
(C) 1—824 Goodman, 42" t.g.
(W) 4—512 DA Goodman
(C&W) 2—12AA Standard Goodmans
(C&W) 5—12AB Standard Goodmans, 35 h.p.
(W) 8—212AA Baby Goodmans
(C) 3—112G3, 220/440 volt AC Goodmans
(C) 2—12GE, 220/440 volt AC Goodmans
(C) 1—712 Goodman
(C&W) 10—35B Jeffrey, 35 h.p.
(C&W) 4—35BB Jeffrey, 50 h.p.
(W) 4—35L Jeffrey, 50 h.p., permissible
(C&W) 4—7AU Sullivans
(C) 4—11B Sullivans
(W) 2—7B Sullivans 220/440 volt
(C&W) 12—Sets trucks for 12AA, 212AA, & 35B machines
(C) 1—29U 220/440 volt, AC, track mounted

LOCOMOTIVES & MINE CARS

(C) 1—MH100 Jeffrey 42" t.g.
(W) 2—MH100 Jeffrey 36" t.g.
(C) 2—MH110 Jeffrey 42" t.g.
(W) 5—HM 823 GE 42" t.g.
(W) 1—HM 822 GE 42" t.g.
(W) 2—HM 803 GE 42" t.g.
(W) 1—HM 805 GE 36" t.g.
(C&W) 3—3314T Goodman, 6 ton, 42" t.g.
(W) 1—6 ton Goodman, 36" t.g.
(W) 1—Vulcan Diesel Locomotive—Rebuilt
(W) 150—44" t.g., end dump, wood mine cars
(W) 75—ACF Drop Bottom, 48" t.g., nearly new
(W) 85—44" t.g., end dump composite cars
(W) 50—36" t.g., ACF Drop Bottom
(W) 45—36" t.g., Sanford Day Drop Bottom
(W) 3—Battery Locomotives, 36" t.g.
(W) 1—Battery Locomotive, 42" t.g.—New

TIPPLE EQUIPMENT

(W) 1—5' Morrow Shaker Screen
(C&W) 4—2 ton Boom Hoist, AC
(C) 1—42" Loading Boom.
(C) 1—48" Loading Boom.
(W) 1—36" Loading Boom
(W) 1—48" Loading Boom
(W) 1—20 h.p., railroad car puller AC
(W) 1—18"x25' belt conveyor
(W) 1—18"x42' belt conveyor
(W) 1—18"x75' belt conveyor
(W) 1—18"x100' belt conveyor
(W) 1—30"x200' belt conveyor
(W) 1—34"x30' belt conveyor
(C) 1—42"x42' belt conveyor
(W) 6—Drag conveyors of various sizes & lengths
(W) 620'—36" belting
(W) 8—Jeffrey Coal Crushers, sizes 24x20, 24x24, 30x30, 36x36, & 30x60

MISCELLANEOUS

(W) 1—200KW West. Rotary 2300/4000Y
(W) 1—150KW GE Rotary 2300/4000Y
(C) 1—200KW MG Set
(W) 1—150KW MG Set
(W) 45—Transformers 5KVA to 50KVA
(C&W) 12—Single Drum Hoist—10, 15, 20, 25, 35, 40, 50, 100, & 150 h.p.
(C) 1—Nolan Car Spotter
(W) 1—Set Fairbanks automatic track scales
(C) 150—Ton 40 & 56 lb. relay rail
(C&W) Motors, pumps, car retarders, cap lamps, drills, shop equipment, air compressors, armatures, and thousands of other items.

WILL PAY TOP DOLLAR for cat mounted loaders, shuttle cars, cat trucks, rubber mounted cutters, belt conveyors, rectifiers, and other late type equipment.

We will buy entire mines on a where is as is basis, call us day or night.

ELECTRIC & MACHINE SUPPLY COMPANY

MINING & INDUSTRIAL EQUIPMENT

Whitesburg, Kentucky
P. O. Box 251 — Ph. 2590 or 2594
Bill Conley

Melvin Adams

Clarksburg, W. Va.
P. O. Box 227 — Ph. 3-0253
H. J. (Hank) Ubbing

***(W) For further information please contact Whitesburg, Ky. *(C) For further information please contact Clarksburg, W. Va.**

Please direct your inquiries to proper location, for prompt quotation. ALL INQUIRIES APPRECIATED.

MANY ITEMS *SOLD!*
BUT - SOME TERRIFIC BARGAINS
ARE STILL AVAILABLE

CALL OR WRITE FOR CATALOG

CHICAGO PHONE LYONS 3-8249

OPERATING EQUIPMENT FROM ORIENT MINE NO. 1 - BEING SOLD AT - - - SACRIFICE PRICES!

HERE ARE A FEW OF THE ITEMS

5 BU Joy Loading Machines 250 V. D.C. 42" Track Gauge.

Dooley Bros. Track Mounted drills, two drill arms mounted, on 42" Track Gauge, self-propelled truck, 260 V. D.C.

600 ALL STEEL PIT CARS
Capacity 4.4 tons, 42" track gauge, end dump.

MOTOR GENERATOR SETS
300 K. W. Westinghouse consisting of: Motor 432 H.P. Synchronous, 2200 volts; Generator 275 volts, D.C., 1090 Amps. Complete with starting equipment.

200 K.W. Westinghouse, consisting of: Motor 290 H.P., 2200 volts; Generator 275 volts, D.C., 728 Amps. Complete with starting equipment.

MINE VENTILATING FANS
Jeffrey No. 8-H-48 Aerodyne Fan with V-Belt drive and 100 H.P., 2400 volts, 1170 R.P.M. induction motor. Also connected to automatic start Waukesha gasoline engine through magnetic clutch.

Jeffrey No. 8-H-60 Aerodyne Fan with V-Belt drive and 175 H.P., 2400/4000 volts, 1150 R.P.M. motor and magnetic controller.

Jeffrey Air Operated Jig consisting of Standard Two-Compartment Five-Cell Baum Type Jig with 84" wide Screen Compartment to handle 500 tons per hour.

HUNDREDS OF ITEMS IN EXCELLENT CONDITION

CHICAGO WILMINGTON & FRANKLIN COAL COMPANY
300 W. WASHINGTON ST. CHICAGO 6, ILL.

PROFESSIONAL SERVICES

NEWELL G. ALFORD
Consulting Mining Engineer
Coal Property Prospecting
Development, Operation and Valuation
Oliver Building — Pittsburgh 22, Pa.

ALLEN & GARCIA COMPANY
42 Years' Service to the
Coal and Salt Industries and Consultants
Construction Engineers and Managers
Authoritative Reports and Appraisals
332 S. Michigan Ave., Chicago
120 Wall Street, New York City

KIRK & COWIN
Ralph E. Kirk — Percy G. Cowin
Registered Professional Engineers
Consulting—Reports—Appraisals
Mechanical Mining of Ore & Coal
Management and Construction of Mines
1—18th St., SW — Birmingham, Ala.
Phone 56-5566

ROBINSON & ROBINSON
Consulting Engineers
Mine Operation — Preparation
Coal Property Valuation
Industrial Engineering
Union Bldg. — Charleston, W. Va.

GEO. S. BATON & COMPANY
"Founded 1900"
Consulting Engineers
Cost Analysis — Valuations
Mine and Preparation Plant Designs
1100 Union Trust Building — Pittsburgh 19, Pa.

HERBERT S. LITTLEWOOD
Consulting Engineer
Application—Supervision of Installation
Maintenance—Inspection—Testing
POWER-HAULING HOISTING
VENTILATION
R. D. #3, Irwin, Pa.

TEMPLETON-MATTHEWS CORPORATION
Designing Engineers—Consultants
Builders
MODERN COAL PREPARATION PLANTS THRU "CO-OPERATIVE ENGINEERING"
906-08 Sycamore Bldg. — Terre Haute, Indiana

EAVENSON, AUCHMUTY & SUMMERS
Mining Engineers
COAL OPERATION CONSULTANTS
VALUATION
2720 Koppers Bldg. — Pittsburgh 19, Pa.

J. B. MORROW
Coal Consultant
Oliver Building — Pittsburgh, Pa.

PAUL WEIR COMPANY
Mining Engineers and Geologists
Consultants and Managers
DESIGN and CONSTRUCTION
20 North Wacker Drive — Chicago 6, Illinois

J. H. FLETCHER
30 Years
Continuous Consulting Service
to Coal Mines
Telephone HArrison 7-5151
332 S. Michigan Ave. — Chicago 4, Illinois

DAVIS READ
Consulting Engineer
Layout — Operation
Modern Production Methods
Plant Design — Preparation
120 S. La Salle St. — Chicago 3, Ill.

J. W. WOOMER & ASSOCIATES
Consulting Mining Engineers
Modern Mines Systems and Designs
Foreign and Domestic Mining Reports
National Bank Building — Wheeling, W. Va.
Henry W. Oliver Bldg. — Pittsburgh, Penna.



HOW ARE YOUR COMMUNICATIONS?

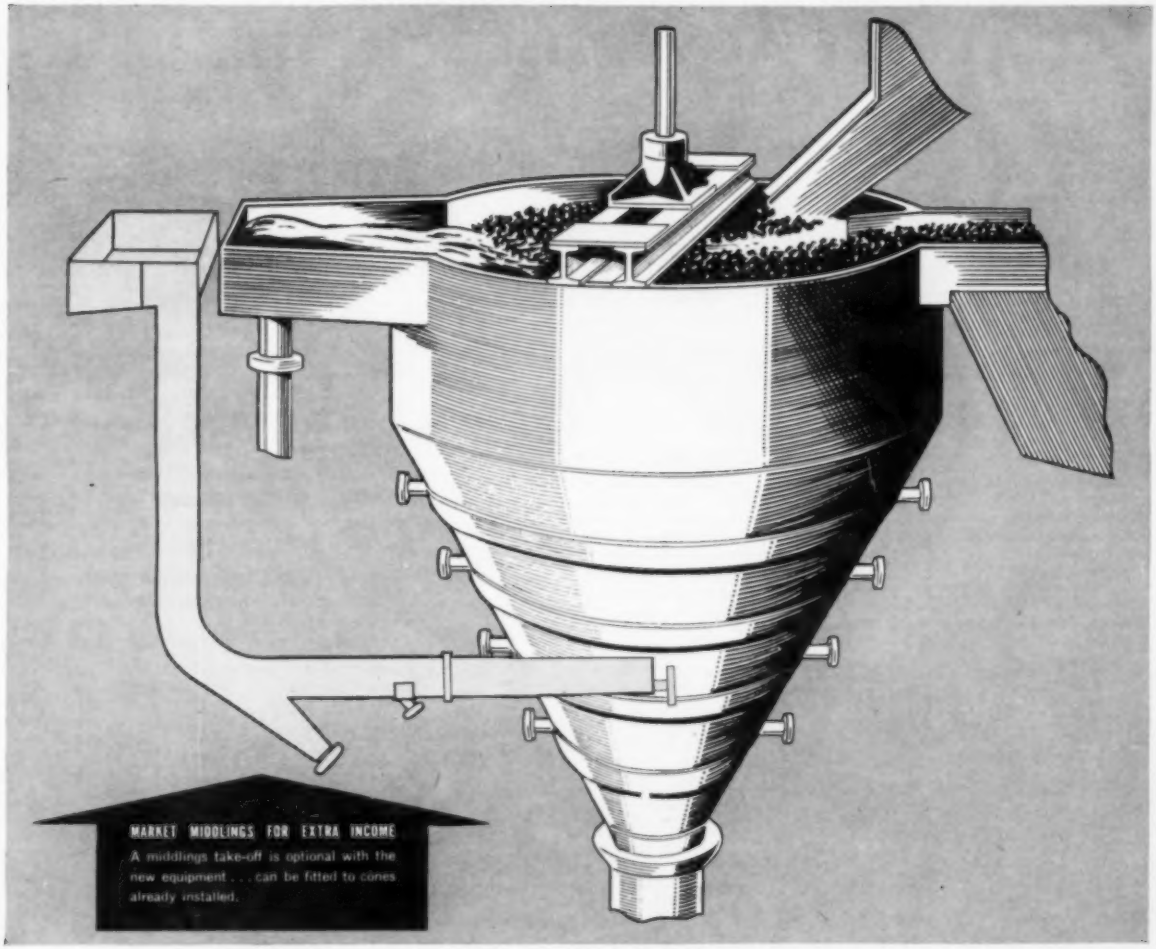
Have you tested your company publications lately? Do they really *work* for you? Today your entire operation is judged by each piece of literature you produce. If you have any doubt as to the impact of your vital communications, remember . . .

COMMUNICATION IS OUR BUSINESS

TWS will write, design, and print your Instruction Manuals, Product Bulletins, Training Aids, Industrial Relations Literature, Annual Reports, Company Histories, etc. Save money and time. Let *our* staff be your staff for Technical and Business publications.

TECHNICAL WRITING SERVICE
McGraw-Hill Book Co.
330 West 42nd Street, New York 36, N. Y.
Phone: LOngacre 4-5000

This service is available through ad agencies.



Time after time, industry leaders choose the Chance Coal Cleaning Process

One of the finest recommendations for the Chance Process is our record of repeat orders. Again and again the big and expanding producers of the industry have reordered Chance Sand Flotation Process equipment.

Today, in use in all the major coal producing countries of the world, Chance Cones are cleaning in excess of 130,000,000 tons of coal annually — *at minimum cost per ton.*

Regardless of the size of your operation or what your coal cleaning problems may be, the Chance Process offers an economical way to get accurately sized, well-cleaned coal. Why not invite our engineers to study and discuss your requirements.

Here Are Some Advantages of the Chance Coal Cleaning Process

High Separating Efficiency

. . . Close to 100% recovery of salable coal

. . Washing gravity not affected by fluctuating rates of feed

Wide Flexibility

. . . Coal handled at gravities from 1.35 to 1.65 with sizes from 1/8 in. to 10 in.

. . . One man can change washing gravity in 5 minutes

Economy of Operation

. . . Heavy, well-built equipment assures troublefree performance

. . Equipment requires only part-time attention of one man

UNITED ENGINEERS

& Constructors Inc

U.E.&C. (Canada) Ltd.

New York 17 • PHILADELPHIA 5 • Chicago 2

COAL AGE ADVERTISERS IN THIS ISSUE

ACF Industries, Inc. ... 115
Aeroquip Corp. ... 139
Allis-Chalmers Mfg. Co. ... 119
Allis-Chalmers Tractor Div. ... 8-9, 147
American Pulverizer Co. ... 12
American Steel & Wire Div. ... 24-25, 151
Anaconda Wire & Cable Co. ... 153
Armstrong-Bray & Co. ... 152
Atlas Powder Co. ... 48

Barber-Greene Co. ... 20
Bethlehem Steel Co. ... 34, 42, 142
Bird Machine Co. ... 4
Bowdil Co. ... 111
Broderick & Bascom Rope Co. ... 125
Bucyrus-Erie Co. ... 51

Caterpillar Tractor Co. ... 101, 127, 180
Centrifugal & Mechanical Industries, Inc. ... 118
Cheatham Electric Switching Device Co. ... 168
Cincinnati Mine Machinery Co. ... 155
Cities Service Oil Co. ... 129
Clark Equipment Co., Construction Machinery Div. ... 44-45
Colorado Iron Works Co. ... 148
Columbia-Geneva Steel Div. ... 10, 24-25, 151
Compton, Inc. ... 110
Continental Gin Co., Industrial Div. ... 49

Daniels Co. ... 18
Deister Concentrator Co. ... 108
Detroit Diesel Engine Div., General Motors ... 109
Dodge Mfg. Corp. ... 154
Dorr-Oliver, Inc. ... 132
Dow Chemical Co. ... 145
Drott Mfg. Co. ... 14-15
Duff-Norton Co. ... 123
duPont de Nemours & Co., E. I., Rubber Chemicals Div. ... 40

Eaton Mfg. Co. ... 35
Ensign-Bickford Co. ... 52
Enterprise Wheel & Car Corp. ... 162
Euclid Div., General Motors ... 137
Exide Industrial Div., Electric Storage Battery Co. ... 163

Fairmont Machinery Co. ... 43
Fletcher & Co., J. H. ... 169
Flexible Steel Lacing Co. ... 128

General Electric Co. ... 117
Goodman Mfg. Co. ... 11
Goodrich Co., B. F. ... 1
Goyne Pump Co. ... 36
Gulf Oil Co. ... 149
Gundlach Machine Co., T. J. ... 150
Guyan Machinery Co. ... 150

Hamilton Rubber Mfg. Corp. ... 136
Harnischfeger Corp. ... 38-39
Hazard Insulated Wire Works ... 157
Hendrick Mfg. Co. ... 124
Heyl & Patterson, Inc. ... 28
Huber-Warco Co. ... 36A
Hulburt Oil & Grease Co. ... 2-3

International Harvester Co., Power ... 26-27
International Harvester Co., Drott Mfg. ... 14-15

Jeffrey Mfg. Co. ... 22-23, 46
Jones & Laughlin Steel Corp. ... 47
Joy Mfg. Co. ... 16-17, 133

Kennametal, Inc. ... 97
Koehring Co. ... 32-33

LeRoi Div., Westinghouse Air Brake Co. ... 41
LeTourneau-Westinghouse Co. ... 19, 21
Leschen Wire Rope Div., H. K. Porter Co. ... 135
Lee-Norse Co. ... 113
Link-Belt Co. ... Fourth Cover
Long Co. ... 29

Macwhyte Co. ... 121
Manitowoc Engineering Corp. ... 156
Marion Power Shovel Co. ... 167
McLanahan-Stone Corp. ... 146
McNally-Pittsburg Mfg. Co. ... 107
Merrick Scale Mfg. Co. ... 118
Mine Safety Appliances Co. ... Second Cover
Morris Machine Works ... 112
Morton Salt Co. ... 159

Nachod & U. S. Signal Co. ... 168
National Mine Service Co. ... 37
National Tube Div. ... 10, 22
Nolan Co. ... 116
Nordberg Mfg. Co. ... 141

Ohio Brass Co. ... Insert between pp. 104-105
Osmose Wood Preserving Co. of America ... 130

Page Engineering Co. ... 161
Paris Mfg. Co. ... 168
Pennsylvania Drilling Co. ... 168
Post-Glover Electric Co. ... 114

Quaker Rubber Div., H. K. Porter Co., Inc. ... Third Cover

Republic Steel Co. ... 30-31
Roberts & Schaefer Co. ... 160
Rockbestos Products Corp. ... 164
Roebling's Sons Co., John A. ... 50

Salem Tool Co. ... 179
Searchlight Section ... 170-176
Simplex Wire & Cable Co. ... 13
Simplicity Engineering Co. ... 144
Sinclair Refining Co. ... 138
Snap-On-Tools Corp. ... 140
Spencer Chemical Co. ... 158
Sprague & Henwood, Inc. ... 166

Templeton, Kenly & Co. ... 166
Tennessee Coal & Iron Div. ... 24-25, 151
Texas Co. ... 6-7
Time Savers for Industry ... 124

United Engineers & Constructors, Inc. ... 177
United States Rubber Co., Electrical Wire & Cable Dept. ... 99
United States Rubber Co., Mechanical Goods Div. ... 103
United States Steel Corp. ... 10, 24-25, 151
United States Steel Export Co. ... 10, 24-25, 151
United States Steel Supply Div. ... 10, 24-25, 151

Vanderbilt Co., Inc., R. T. ... 152

Wedge-Wire Corp. ... 128
Whitmore Mfg. Co. ... 143
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp. ... Insert between pp. 36-37
Wilfley & Sons, Inc., A. R. ... 165
Wilmot Engineering Co. ... 131

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES ... 170

BUSINESS OPPORTUNITIES ... 170

EQUIPMENT
(Used or Surplus New) For Sale ... 170-175

WANTED
Equipment ... 170

PROFESSIONAL SERVICE ... 176

ADVERTISERS INDEX

Bonded Scale & Machine Co. ... 171
Coal Mine Equipment Sales Co. ... 170
Chicago, Wilmington & Franklin Coal Co. ... 175
Electric Equipment Co. ... 172
Electric & Machine Supply Co., Inc. ... 175
Electric Service Co., Inc. ... 174
Eljay Inc. ... 170, 172
Fish & Co., J. T. ... 172
Freeman Coal Mining Corp. ... 173
Gavenda Brothers Inc. ... 174
Greensburg Machine Co. ... 170
Harris-Walsh Inc. ... 174
Ironton Engine Co. ... 174
Lefton Industrial Co. ... 170
McLeod, A. T. ... 170
Morse Bros. Machinery Co. ... 172
Simpson Coal & Chemical Co. ... 170
Smith Co., H. Y. ... 170
Swabb Equipment Co., Inc., Frank ... 170, 172, 174
Telephone Engineering Co. ... 170
Traux-Traer Coal Co. ... 174

This index is published as a convenience to the reader. Every care is taken to make it accurate, but C. A. assumes no responsibility for errors or omissions.

Lowest cost per ton
Self-propelled from hole to hole
Heavy-Rugged-Powerful

● Delivering 250 to 300 tons of coal per day using 36-inch diameter, 6-foot-long augers, the Model 6 McCarthy Coal Recovery Drill lowers your costs per ton and total operating costs. Shorter in length—only 18′ by 6′ wide—the Model 6 operates easily in narrow strip pits or where operators are "facing-off" hillsides for auger boring. The self-propelled drill moves quickly from hole to hole, carrying the same rugged power as the Model 12 and 14 McCarthy Drills.

HYDRAULICALLY OPERATED

LEVELING JACKS · AUGER LIFT · MOVING JACKS
AUGER GUIDE · AUGER FEED

Let us check your property to recommend the right McCarthy Coal Recovery Drill for maximum tonnage at lowest cost. Send for Bul. M-101. The Salem Tool Company, Salem, Ohio.



THE SALEM TOOL COMPANY · SALEM · SALEM, OHIO, U. S. A.

MODEL 6-30-36 x 6 McCARTHY COAL RECOVERY DRILL with G.M.C. 4-cylinder diesel engine, FAU Cotta transmission, 14" Rockford Clutch, speed reducer and box-type main frame and engine base. Sizes available for using 20, 24, 30, 36 and 42" diameter augers.

THE SALEM TOOL COMPANY
SOUTH ELLSWORTH AVE. · SALEM, OHIO, U. S. A.

FIRST REPORT

ON THE NEW D9

FROM BRILLIANT, OHIO



That big load on the blade tells a lot of the story. The CAT* D9 Tractor with No. 9S Bulldozer can handle up to 12 yds. per pass, and can travel at speeds up to 7.8 MPH. This D9 is stripping overburden from a seam of No. 8 coal for Tri-State Coal Co., five miles west of Brilliant, Ohio. Depth of overburden varies from 35 to 72 ft. The big yellow "King of the Crawlers" was only two months old when the picture was taken, and had been used on leveling spoil banks and other reclamation jobs, so accurate production figures were not yet available.

But there's no doubt that the new Cat D9 Tractor's performance will be outstanding. Owners report that it outworks previous big rigs by as much as two to one! Its completely new four-cycle diesel engine delivers 286 HP. The new Turbocharger, driven by engine exhaust, packs in air according to *load*, not RPM, for more working horsepower at all tractor speeds.

The D9 is tough and traditionally Caterpillar from its one-piece frame and steering clutch case assembly to track shoes hardened by a new "water quench" process. It's the product of many thousands of hours' testing on proving grounds and actual jobs in construction, mining and quarrying. And it's already a favorite with operators, thanks to hydraulically boosted steering and brakes, "in-seat" starting, and smooth "live shaft" drive for cable controls.

According to a Tri-State official, the firm bought its new D9 because of past performance of its Caterpillar equipment. "We've used Caterpillar products for a number of years with great success," he says. "Our local Caterpillar Dealer's co-operation was an important factor in our buying the D9." Why not get all the facts on this "workingest" tractor of them all from your Caterpillar Dealer? Call him today—and count on him for reliable service and Caterpillar parts you can trust.

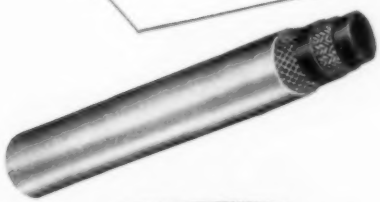
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

For long, trouble-free service . . . use Quaker hose



AIR Extra lightweight, highly flexible hose for heavy duty work. Resists weather damage and abrasion. Non-porous tube of oil resistant rubber compound. Rugged Neoprene cover. Ideal for almost any hose installation.



FIRE Resilient, flat-folding hose saves space and gives long service in interior fire protection. Highly flexible and resistant to cracking. Leak-proof tube bonded to strong single jacket cover. Recommended for institutions, offices, ships, etc.



STEAM Many times stronger than wrapped fabric hose for general steam-handling jobs. Also lighter, more flexible and kinkproof for easier handling. Steel wire and glass reinforcing insures extra safety. Resists high pressures up to 388° F.



WELDING No twisted, tangled lines. Two lines are securely bonded together to form a single, safe hose unit. Kink-free and resistant to welding gases. Stands up to lots of dragging across rough surfaces. Especially effective on portable welding dollies.



WATER For long wear and outstanding value, this easy-to-handle hose has what you need. Reinforced with multiple plies of high tensile yarn, it takes higher than usual working pressures. Cover stands up to weather extremes without cracking or peeling.

Save time and money. Call your Quaker-Quaker Pioneer distributor first, *when you need hose or other industrial rubber products. You'll find him prompt, dependable.*

DIVISIONS OF HKP H. K. PORTER COMPANY, INC.

H. K. PORTER COMPANY, INC.

QUAKER RUBBER DIVISION
Philadelphia 24, Pa.

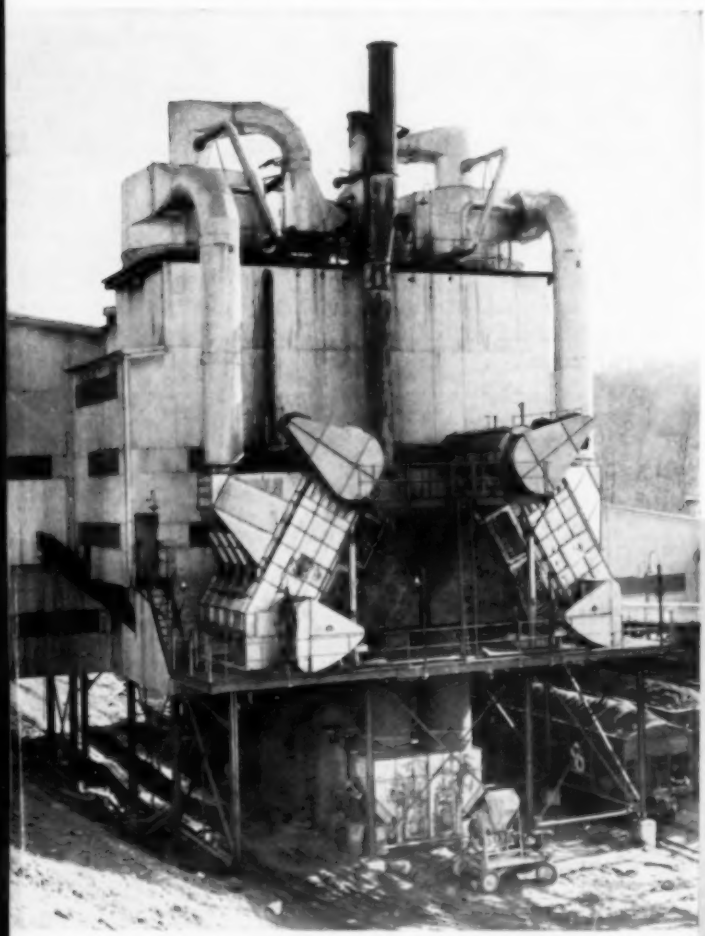
QUAKER PIONEER RUBBER DIVISION
San Francisco 7, California

Coal operators order and re-order LINK-BELT Multi-Louvre Dryers

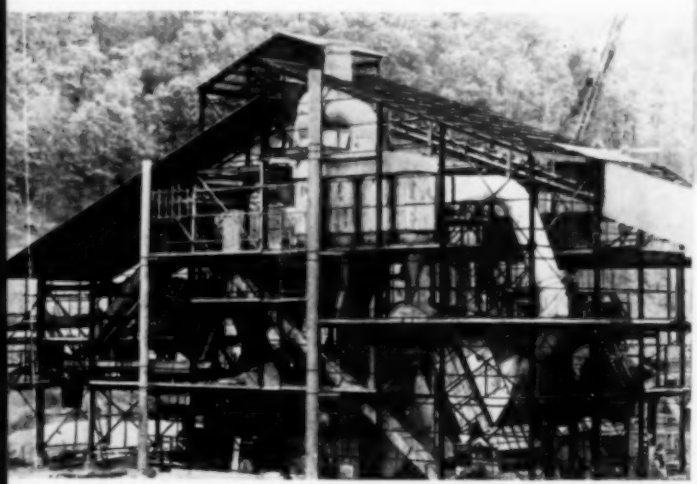
Yes, they're No. 1 choice for fast, safe, low-cost drying of 1½- to 0-inch coal

OF more than 40 Link-Belt Multi-Louvre Dryers now operating in preparation plants, the majority are repeat orders. And there's good reason for this continuing popularity. Special design minimizes air pressure drop . . . cuts power consumption and cost—*often as much as 50%*. And low air velocity reduces degradation and dusting . . . makes dust collection easy.

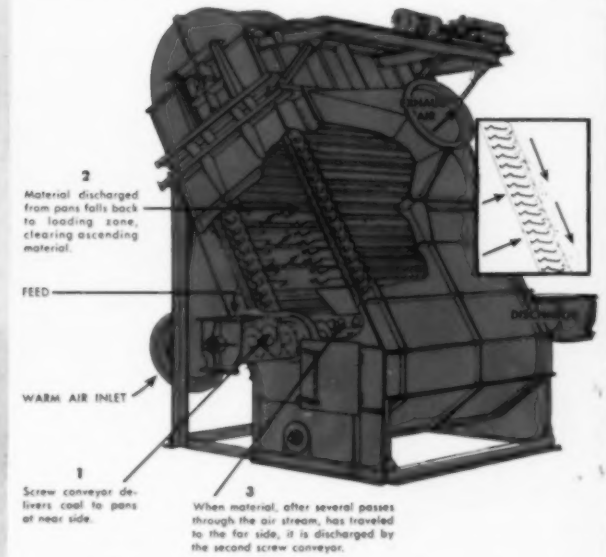
Just as important are the Multi-Louvre Dryer's accurate automatic controls that vary the feed rate and maintain low air intake temperatures, thus preventing oxidation . . . insuring uniform moisture reduction. For more complete information on how the Link-Belt Multi-Louvre Dryer can help you produce a better, more marketable product, call your nearby Link-Belt office. Or write for Book 2466.



Lower maintenance costs result from the simple design of these two Link-Belt Multi-Louvre Dryers at a West Virginia mine.



Lower temperatures possible with Multi-Louvre Dryers like this one at a Kentucky mine assure adequate moisture reduction.



Maximum heat transfer—Louvre pan action spreads coal in thin layers . . . directs air currents through moving curtain of material for highest operating efficiency.

LINK-BELT

15.011

MULTI-LOUVRE DRYERS

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 15, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Scarboro (Toronto 13), Springs (South Africa).